











Travel research education talks seminar...nardo Kopecek Jhon Lee Sung Kubanek

-  1980 Korea Jhon KIST guest house Korea .pdf
-  1981 korea trip visa application kais kangneung .pdf
-  1986 Korea KAIST Immunosensors.pdf
-  1996 Korea Taejon KRICT Biosensors.pdf
-  1996 Korea-Japan KRICT talk Taejon.pdf
-  2001 Korea science without walls dongguk Univ.pdf
-  Prague 1977 Exchange Visit Andrade...Prague report Kalal Schultz letters .pdf
-  Prague 1987 - 1989 Kubanek Andrad...ecek correspondence Prague IMC .pdf
-  Prague 1988 Kopecek Andrade Vacik IMC Prague Czech Life #7 media .pdf
-  Prague 1989 media Kubanek Prague i...erview by andrade MDDI Kopecek .pdf

Korea
(19)

Dr. Joseph D. Andrade's Itinerary

- June 9 (Fri.) Arrives at Kimpo Via KE005 8:30 A.M.
Stay at KIST guest house
- June 10 (Sa.) KIST & KAIS visit • sight seeing, 2:30pm - 6:00pm, Walker Hill show at 7:00pm
- June 11 (Sun.) Sight Seeing in Seoul
- June 12 (Mon.) Seminars 3:00 - 4:00 P.M.
Polymer Surfaces (KAIS) Center Dinner
- June 13 (Tu.) Seminars 3:00 - 4:00 P.M.
ESCA Review & Perspectives (KAIS)
- June 14 (Wed.)
- June 15 (Th.) Seminars 11:00 - 12:00 A.M.
Hydrogel Hypothesis, Gel-Water Interface
KIST Lunch Dinner at Dr. Han's
- June 16 (Fri.) Leaves for Pusan. Stay at Dong Ne Tourist Hotel
- June 17 (Sa.) Seminar at Pusan National Univ. and - uses S-E T.
Leaves for Kyong Ju. Stay at Bul Buk Sa Hotel
- June 18 (Sun.) Arrives at Hae Un Dae Hotel
- June 19 (Mon.) Leaves for Seoul
- June 20 (Tu.) Sight Seeing (Volk Villiage)
Seminars 2:00 - 3:00 P.M.
Polymer Surface Analysis - ESCA Assoc w/ Fr. gov't - Polymer Inst.
(Aju Institute of Technology)
- June 21 (Wed.) Shopping ~~Walker Hill show at 7:00pm~~
- June 22 (Th.) Depart Seoul Via KE006 at 9:00 P.M.

한 국 과 학 원
THE KOREA ADVANCED INSTITUTE OF SCIENCE

P. O. Box 150 Chongyangni : Seoul, Korea

May 3, 1980

Dr. Joseph D. Andrade
Department of Bioengineering
Merrill Engineering Bldg.
University of Utah
Salt Lake City, Utah 84112
U.S.A.

Dear Dr. Andrade:

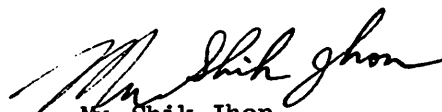
Thank you very much for your letter posted on April 25, 1980.
We have reserved a room for you in KIST guest house starting
June 15 to June 25.

We still expect to have you here as scheduled even we might
have some uncertainty in ESCA delivery time.

During your stay, we will discuss a new problem dealing with
the modeling and mechanism of interface electrical potentials.
And, I know you will give us some tutorial lectures for ESCA.

We look forward to seeing you soon. Thank you.

Sincerely yours,



Mu Shik Jhon
Professor of Chemistry

RECEIVED

MAY 3 1980

BIOENGINEERING

대한민국
REPUBLIC OF KOREA

사증발급신청서
APPLICATION FOR VISA

APPLICATION NO. _____

PASSPORT CLASSIFICATION
DIPLOMATIC ()
SPECIAL ()
REGULAR (✓)

DATE MARCH 30, 1981

1. NAME ANDRADE JOSEPH D (SEX M) 2. NATIONALITY USA
LAST FIRST MIDDLE

3. PLACE OF BIRTH HAYWARD, CALIF USA DATE OF BIRTH 7-13-41

4. PRESENT ADDRESS 6009 Highland Dr, Salt Lake PHONE NO. 801 277 1259

5. PERMANENT ADDRESS same

6. SPOUSE'S NAME & NATIONALITY Barbara Andrade

7. OCCUPATION & TITLE (EXPLAIN FULLY) Professor, Univ of Utah

8. PURPOSE OF ENTRY (EXPLAIN FULLY) Scientific visit to Korean Advanced Institute of Science as part of Joint Korea-USA Scientific research project on polymers (plastics)

9. PASSPORT NO. J 298 2223 ISSUED BY USA ON 11/6/78 VALID TILL 11/5/81

10. PREVIOUS VISIT, IF ANY June, 1980 DESIRED LENGTH OF STAY 2 weeks

11. PORT OF EMBARKATION Seattle MEANS OF TRANSPORTATION Air

12. PORT OF ENTRY (KOREA) _____ EXPECTED DATE OF ENTRY _____

13. ADDRESS IN KOREA Korea Adv. Inst. of Science PHONE NO. _____

14. THREE REFERENCES IN KOREA (FOR ENTRY VISA ONLY)

NAME	ADDRESS
Dr. M. S. Jhon	Korea Advanced Inst. of Science, P.O. Box 150 Chongyongni, Seoul, Korea
Dr. T. K. Rhee	
Dr. D. Ryu	

5. IMMEDIATE MEMBERS OF FAMILY, IF ACCOMPANIED

NAME	SEX	AGE	RELATION	NATIONALITY
<u>None</u>				



I declare that the statements made in this application are true and correct to the best of my knowledge and belief, that I will observe the provisions of the Law on Control of Exit and Entry of the Republic of Korea, and that I will not engage in any activities irrelevant to the purpose of entry stated herein.

3/30/81
DATE

Joseph Andrade
SIGNATURE OF APPLICANT

Korea Trio Itinerary

Mon 5/18 Arrive Seoul on Delta at 4:30 PM
Hotel: Sofitel Ambassador, Seoul
Dinner with YK Song and Won Kim
0652-210-2301

Tues 5/19 Breakfast with HB Lee at hotel.
AM train w/ Lee to Yusong
Hotel Adria 042-824-0211

PM Prof. Sung Soon Chun,
President, KAIST
Phone 042 869-2001
FAX 042 869-4800

Lecture on University Management
and Science Education

Wed 5/20 8 - Breakfast with MSJhon:

10 - KRICT - HB Lee 042-860-7220
(home) 042-861-0271

Lecture: Protein Interactions with
Gradient Surfaces.

Thurs 5/21 AM - KRICT Discussion
Noon - Observe 6th grade science class

2:40 - To Kangreung by bus

Host Sang Al Jeon 0391-640-
2303

5/22 Kangnung National Univ
Sang Al Jeon

0391-640-2303 FAX 0391-43-7110

5/23 Lecture on AFM
9:05 Kangnung to Seoul by air
4:15 PM Seoul → USA

Korea 21

- 15:50 이해방 (화학연 고분자 3 연구실)
Materials for Contact Lens
- 16:30 김낙중 (KAIST 고분자화학연구실)
Surface Modification by Plasma for
Biomedical Polymers

한국과학기술원
화공·고분자연구부 심포지움(I)

의료용 고분자의 현황과 미래

수강안내

1986. 11. 21

1. 일 시 : 1986. 11. 21 (금) 09:00~17:10
2. 장 소 : 한국과학기술원 (KAIST)
서부 제4 회의실 (구 KIST 건물)
3. 정 원 : 40명 (선착순)
4. 수강료 : 3만원 (교재대 포함)
5. 접수 및 기간 : 1986. 11. 1~11. 18
6. 접수 및 문의처 : 한국과학기술원 화공·고분자연구부, 고분자화학연구실
한동근, 김선옥 967-8801 (교) 3464
Organizer 김영하 (KAIST 고분자화학연구실장)
이해방 (화학연 고분자 3 연구실장)



주최 : 한국과학기술원
후원 : 한국화학연구소
한국고분자학회
대한의용생체공학회

강좌시간표

초 청 장

저희 한국과학기술원은 그동안 국내 산업기술 발달을 위하여 목적기초 및 응용개발 연구에 노력하여 왔습니다. 금번 본 원에서 급진하는 세계의 연구동향을 분석하고 국내 관련산업 기술 개발을 지원하기 위하여 전문 학술회의를 계획 하였습니다.

의료용 고분자는 국민의료복지를 향상시키는 공익분야인 동시에 인공장기와 치료제품의 개발은 미래형 산업으로서 막대한 잠재시장을 가지고 있는 유망분야입니다. 따라서 금번 관련 국내의 전문가를 초청하여 개발동향을 정리, 분석함으로써 산업계는 물론 학교, 연구계에도 많은 도움이 되는 강좌가 되도록 준비하였습니다. 바쁘시더라도 꼭 참석하셔서 유익한 정보수집과 기술 검토의 좋은 기회가 되기를 희망합니다.

1986. 11

한국과학기술원

원장 이 정 오

11월 21일 (금) KAIST 제 4 회의실

- 09 : 00 등 록
- 09 : 30 안광덕 (KAIST 고분자화학연구실)
Biodegradable Polymers for Medical Application
- 10 : 10 Y. Sakurai (일본 동경여의대, Inst. of Biomedical Engineering)
Biomaterials toward Future Medicine
- 11 : 00 Y. Ikada (일본 Kyoto 대, Research Center for Medical Polymers and Biomaterials)
Surface Grafting by Plasma to Produce Hemocompatible Polymers
- 11 : 40 김영하 (KAIST 고분자화학연구실)
Antithrombogenic Heparinized Polyurethanes
- 12 : 20 점 심
- 13 : 30 T. Okano (미국 Utah 대 약대)
New Studies on Transdermal Drug Delivery System
- 14 : 10 김계용 (한양공대 공업화학과)
Synthesis and Property of Polymeric Skin Substitutes
- 14 : 50 휴 식
- 15 : 10 J. D. Andrade (미국 Utah 대 공대)
Fiber Optics for Immuno-sensors

Registration

Registration Fee:

50,000 won (including proceedings,
2 lunches and reception)

Student Discount Registration Fee:

10,000 won (including proceedings and
2 lunches)

15,000 won for reception

Any inquiries should be addressed to:

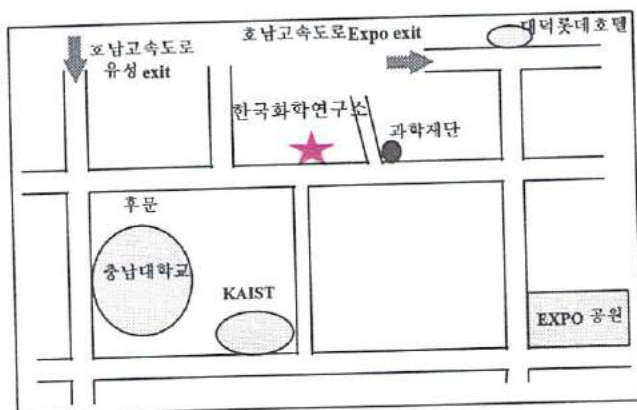
Seaung Y. Oh or Soon Hong Yuk
Biomaterials Laboratory, KRICT
P.O. Box 107, Yusung, Taejeon
305-606, Korea
Tel: 042-860-7225-6
Fax: 042-861-4151
E-mail: syoh@pado.kRICT.re.kr

THIRD INTERNATIONAL SYMPOSIUM ON BIOMATERIALS AND DRUG DELIVERY SYSTEMS



July 4-5, 1996
Korea Research Institute of
Chemical Technology
Taejeon, Korea

약도



Invitation

The Biomaterials Laboratory of KRICT (Korea Research Institute of Chemical Technology) is hosting the Third International Symposium on Biomaterials and Drug Delivery Systems and cordially invites you to participate in this scientific program. The symposium will be held July 4-5 at the auditorium of KRICT, Taejeon, Korea. Leading scientists from U.S.A., Japan and Korea, will be presenting their exciting results.

This international symposium is organized to provide biomedical and pharmaceutical research scientists with recent trends and advancements, and to promote the progress in this field in Korea. We hope that this symposium will stimulate your creativity and help you to have further understanding in the biomaterial science and drug delivery systems.

We are looking forward to seeing you in the symposium.

Suh Bong Rhee
President of KRICT

Program

- Thursday, July 4, 1996 -

- 08:50-09:20 Registration
- 09:20- 09:30 Opening Remarks,
Suh Bong Rhee, President of KRICT
- 09:30-10:05 Syntheses and Biological Activities of Exo-3,6-Epoxy-1,2,3,6-Tetrahydrophthalic Anhydride and Its Polymers Containing 5-Fluorouracil, Won-Jei Cho, Pusan National University, Korea
- 10:05-10:45 Direct Reading Biosensors: Monitoring Metabolism Without Instruments, Joseph D. Andrade, University of Utah, U.S.A.
- 10:45-11:00 Coffee Break
- 11:00-11:35 Effect of Ligand Orientation on Hepatocyte Attachment onto the Poly(N-p-vinyl benzyl-o- β -D-galacto-pyranosyl-D-gluconamide) as a Model Ligand of Asialoglycoprotein, Chong. S. Cho, Chonnam National University, Korea
- 11:35-12:15 Conjugates of Stimuli-Responsive Polymers and Biomolecules: Random and Site-Specific Conjugates of Temperature-Sensitive Polymers and Proteins, Allan S. Hoffman, University of Washington, U.S.A.
- 12:15-12:50 Temperature-sensitive Liposomal Lipid Bilayers Coated With Poly(N-isopropylacrylamide-co-acrylic acid), Jong-Duk Kim, KAIST, Korea
- 12:50-13:50 Lunch

- 13:50-14:25 Phospholipase C-mediated Liposome Immunoassay for Insulin, Jong-Kook Kim, Seoul National University, Korea
Robinson, University of Wisconsin, U.S.A.
- 14:25-15:05 Challenges in Transdermal Product Development, Su Il Yum, ALZA Corp., U.S.A.
- 15:05-15:40 Electrical Properties of Skin, Seung. Y. Oh, KRICT, Korea
- 15:40-16:20 Mechanistic Studies of Two Antioxidants for Poly(etherurethane ureas) In an Accelerated *In Vitro* Biodegradation System, James M. Anderson, Case Western Reserve University, U.S.A.
- 16:20-16:40 Photo and Coffee Break
- 16:40-17:15 Development of New Biodegradable Polyesters for Biomedical Applications, Yong Kiel Sung, Dongguk University, Korea
- 17:15-17:55 Monomers/Polymers Used in Dental Adhesives, Byoung I. Suh, BISCO, U.S.A.
- 17:55-18:30 Delivery Vehicles for Growth Factors, Suk-Zu Song, Chungam Biotech Research Center, Korea
- 18:30-20:10 Reception
- Friday, July 5, 1996 -**
- 09:00-09:30 Registration
- 09:30-10:05 Lipiodolized Emulsion for Hepatoma Targeting and Treatment, Seo Young Jeong, KIST, Korea
- 10:05-10:45 Mechanistic Studies on Effervescent Dosage Forms and Use With Bioadhesive Systems, Joseph R. Robinson, University of Wisconsin, U.S.A.
- 10:45-11:00 Coffee Break
- 11:00-11:35 Protein and Cell Interactions on Various Gradient Surface, Jin Ho Lee, Han Nam University, Korea
- 11:35-12:15 Control of Protein Packing in Two Dimensional Regular Array: Approach Toward Bioelectronic Devices, Hiroyuki Sasabe, RIKEN, Japan
- 12:15-13:50 Lab Tour & Lunch
- 13:50-14:25 Micropatterning of Cultured Cell on Modified Polymer Surfaces, Jae-Suk Lee, Kwangju Insititute of Sci. & Tech. Korea
- 14:25-15:05 Hip Joint Prosthesis Fixation-Problems and Possible Solutions, Joon B. Park, University of Iowa, U.S.A.
- 15:05-15:40 Hydrogen Bonding Potential As a Determining Factor For Peptide Transport Across Biological Membrane, Dong-Chool Kim, Chungnam National University, Korea
- 15:40-15:55 Coffee Break
- 15:55-16:35 Computer Simulation in Drug Delivery and Biomaterials Research, Kinam Park, Purdue University, U.S.A.
- 16:35-16:55 Future Perspectives of Biomaterials Research, Sung Wan Kim, University of Utah, U.S.A.
- 16:55-17:00 Closing Remarks, Hai Bang Lee, KRICT, Korea

Foreign Speaker's Profile

James M. Anderson

Professor, Case western Reserve Univ.,
Past-President of Society for Biomaterials,
30+ Years Research, 150+ Publications in
Biomaterials, MERIT Award from NIH

Joseph D. Andrade

Professor, Univ. of Utah,
Past-Dean of College of Engineering,
30+ Years Research, Cleamson Award

Allan S. Hoffman

Professor, Univ. of Washington,
Past-President of Society for Biomaterials,
40+ Years Research, 210+ Publications,
7 Awards and Prizes

Sung Wan Kim

Professor, Univ. of Utah,
30+ Years Research, 335+ Publications and
15 U.S. Patents, 7 Awards and Prizes,
Founder of TheraTech Inc. & MacroMed Inc.

Joon Boo Park

Professor, Univ. of Iowa,
30+ Years Research, 100+ Publications,
3 Awards and Prizes

Kinam Park

Professor, Purdue Univ.,
CRS-Globalization Chair,
17+ Years Research, 110+ Publications,
2 Awards from NIH & CRS

Joseph R. Robinson

Professor, Univ. of Wisconsin,
Past-president of CRS and AAPS
30+ Years Research, 6 Awards and Prizes,

Hiroyuki Sasabe

Head of Biopolymer Physics Lab., RIKEN,
30+ Years Research,
Visiting Professor - U.S.A., Japan, China, Korea

Byoung In Suh

President of BISCO, Founder of BISCO,
25+ Years Dental Materials R&D, 7 US Patents

Su Il Yum

Executive Director of Transdermal R & D, Alza,
30+ Years R & D, 40+ Publications & 50 U.S.
Patents

Symposium Chairperson

Hai Bang Lee

Head of Biomaterials Lab.

Program Chairpersons

Seaung Youl Oh (Biomaterials Lab., KRICT)
Sung Soo Kim (Biomaterials Lab., KRICT)
Soon Hong Yuk (Biomaterials Lab., KRICT)
Byung Chul Shin (Biomaterials Lab., KRICT)
Kil Sun Kang (Biomaterials Lab., KRICT)
Sun Hang Cho (Biomaterials Lab., KRICT)

Sponsors

KRICT
The Ministry of Science and Technology
The Polymer Society of Korea
The Korean Controlled Release Society
Korea Institute of Science and Technology

Jae,
Ph. ~~update~~.
-m

Korea — Japan Trip

July 1 - 11, 1996

- July 1: Salt Lake City — Seoul (July 2)
- July 2: Arrival Seoul — Travel to Daeduck
- July 3: Visits to Sam Yang, KRICT, and KAIS
- July 4-5: Int. Symp. on Biomaterials
Daeduck, Korea
- July 6: Korea — Japan
Seoul, Korea — Osaka, Japan
- July 7 - 10: Controlled Release Symposium
Kyoto, Japan
- July ~~11~~¹⁰: Japan to SLC
Osaka — Salt Lake City

From:

J.D. Andrade
University of Utah
(801) 581-5361 (FAX)
(801) 581-4379

Korea

Hotel: Lotte Hotel, Daeduck

Host: H.B. Lee

phone 82-42-860-7220

FAX 82-42-861-4151

Japan

Hotel: Palace Side Hotel.

phone Japan - 075-431-8171

FAX " - 075-341-1028

~~HCTP~~
Kova (21)

**THIRD
INTERNATIONAL
SYMPOSIUM
ON
BIOMATERIALS
AND
DRUG DELIVERY
SYSTEMS**



**JULY 4~5, 1996
Korea Research Institutes
of Chemical Technology
TAEJEON, KOREA**

Invited Lectures

- Thursday, July 4, 1996 -

08:50 ~ 09:20	Registration	
09:20 ~ 09:30	Opening Remarks Dr. Suh Bong Lee, President of KRICT	
	<i>(Chairperson: Dr. Hai Bang Lee)</i>	
09:30 ~ 10:05	Syntheses and Biological Activities of Exo-3,6-Epoxy-1,2,3,6-Tetrahydrophthalic Anhydride and Its Polymers Containing 5-Fluorouracil Prof. Won-Jei Cho (Pusan National University, Korea)	1
10:05 ~ 10:45	Direct Reading Biosensors: Monitoring Metabolism Without Instruments Prof. Joseph D. Andrade (University of Utah, U.S.A.)	6
10:45 ~ 11:00	Coffee Break	
	<i>(Chairperson: Prof. Sung Wan Kim)</i>	
11:00 ~ 11:35	Effect of Ligand Orientation on Hepatocyte Attachment onto the Poly(N-p-vinylbenzyl-o- β -D-galacto-pyranosyl-D-Gluconamide) as a Model Ligand of Asialoglycoprotein Prof. Chong S. Cho (Chonnam National University, Korea)	10
11:35 ~ 12:15	Conjugates of Stimuli-Responsive Polymers and Biomolecules: Random and Site-Specific Conjugates of Temperature-Sensitive Polymers and Proteins Prof. Allan S. Hoffman (University of Washington, U.S.A.)	18
12:15 ~ 12:50	Temperature-Sensitive Liposomal Lipid Bilayers Coated with Poly(N-isopropylacrylamide-co-acrylic acid) Prof. Chong-Duk Kim (KAIST, Korea)	29
12:50 ~ 13:50	Lunch	
	<i>(Chairperson: Prof. Kinam Park)</i>	
13:50 ~ 14:25	Phospholipase C-mediated Liposome Immunoassay for Insulin Prof. Jong-Kook Kim (Seoul National University, Korea)	39
14:25 ~ 15:05	Challenges in Transdermal Product Development Dr. Su Il Yum (ALZA Corp., U.S.A.)	43
	<i>(Chairperson: Prof. Joseph R. Robinson)</i>	
15:05 ~ 15:40	Electrical Properties of Skin	50

Dr. Seung Y. Oh (KRICT, Korea)

15:40 ~ 16:20	Mechanistic Studies of Two Antioxidants for Poly (etherurethane ureas) in an Accelerated <i>In Vitro</i> Biodegradation System Prof. James M. Anderson (Case Western Reserve University, U. S. A.)	65
16:20 ~ 16:40	Photo and Coffee Break	
	(Chairperson: Dr. Young Ha Kim)	
16:40 ~ 17:15	Development of New Biodegradable Polyester for Biomedical Applications Prof. Yong Kiel Sung (Dongguk University, Korea)	69
17:15 ~ 17:55	Monomers/Polymers Used in Dental Adhesives Byoung I. Suh (BISCO, U.S.A.)	75
17:55 ~ 18:30	Delivery Vehicles for Growth Factors Dr. Suk-Zu Song (Chungam Biotech Research Center, Korea)	84
18:30 ~ 20:10	Reception	

- Friday, July 5, 1996 -

09:00 ~ 09:30	Registration	
	(Chairperson: Prof. Allan S. Hoffman)	
09:30 ~ 10:05	Lipiodolized Emulsion for Hepatoma Targeting and Treatment Dr. Seo Young Jeong (KIST, Korea)	90
10:05 ~ 10:45	Mechanistic Studies on Effervescent Dosage Forms and Use with Bioadhesive Systems Prof. Joseph R. Robinson (University of Wisconsin, U.S.A.)	96
10:45 ~ 11:00	Coffee Break	
	(Chairperson: Prof. Joseph D. Andrade)	
11:00 ~ 11:35	Protein and Cell Interaction on Various Gradient Surfaces Prof. Jin Ho Lee (Han Nam University, Korea)	98
11:35 ~ 12:15	Control of Protein Packing in Two Dimensional Regular Array: Approach Toward Bioelectronic Devices Dr. Hiroyuki Sasabe (RIKEN, Japan)	105
12:15 ~ 13:50	Lab Tour and Lunch	

13:50 ~ 14:25	<p style="text-align: right;"><i>(Chairperson: Prof. Chong S. Cho)</i></p> Micropatterning of Cultured Cell on Modified Polymer Surfaces Prof. Jae-Suk Lee (Kwangju Institute of Sci. and Tech., Korea)	114
14:25 ~ 15:05	Hip Joint Prosthesis Fixation-Problems and Possible Solutions Prof. Joon B. Park (University of Iowa, U. S. A.)	120
15:05 ~ 15:40	Hydrogen Bonding Potential as a Determining Factor for Peptide Transport Across Biological Membrane Prof. Dong-Chool Kim (Chungnam National University, Korea)	154
15:40 ~ 15:55	Coffee Break	
15:55 ~ 16:35	<p style="text-align: right;"><i>(Chairperson: Dr. Hiroyuki Sasabe)</i></p> Computer Simulation in Drug Delivery and Biomaterials Research Prof. Kinam Park (Purdue University, U.S.A.)	162
16:35 ~ 16:55	Future Perspectives of Biomaterials Research Prof. Sung Wan Kim (University of Utah, U.S.A.)	168
16:55 ~ 17:00	Closing Remarks Dr. Hai Bang Lee (KRICT, Korea)	



연락 및 문의처

동국대학교 자연과학연구원
100-715 서울특별시 중구 필동3가 26
TEL : (02) 2260-3511
FAX : (02) 2260-3511
E-Mail : rins@dongguk.edu
Homepage : <http://rins.dongguk.ac.kr>

Korea (21)



동국대 자연과학연구원 특별초청강연회

Science without Walls – Science in Your World

Joseph D. Andrade
University of Utah



일시 : 2001년 6월 04일(월) 5:00(오후)
장소 : 명진관 A104
주최 : 동국대학교 자연과학연구원



모시는 글

저희 자연과학연구원에서는 Joseph D. Andrade 교수님을 모시고 'Science without Walls - Science in Your World'라는 주제로 세미나를 개최하게 되었습니다. 바쁘시더라도 많이 참석하시어 관련분야의 유익한 학술정보를 나눌 수 있는 기회가 되시길 바라겠습니다.

2001년 6월 4일

동국대학교 자연과학연구원

원장 박인국

자연과학연구원 특별조정강연회

연사약력

학력

- 1965 B.S., Materials Science, San Jose State University, U.S.A.
- 1969 Ph.D., Materials Science, University of Denver, U.S.A.

경력

- 1983 Dean, College of Engineering, Univ. of Utah
- 1987 Distinguished Alumnus Award, San Joes State Univ.
- 1991 Co-Director, Center for Scinence Education
- 1992 Vice President, for Public Policy, AIMBE
- 1992 Governor's Medal for Science and Technology
- 1998 Chairman, Department of Pharmaceutics, Univ. of Utah
- 1998 Co-Chair, Dept. of Bioengineering, Univ. of Utah

강연일정

- | | | |
|---------------|-------|--------------------|
| 17:00 ~ 17:05 | ----- | 인사말씀 : 박 태 준 교수 |
| 17:05 ~ 17:50 | ----- | 특 강 : J Andrade 교수 |
| 17:50 ~ 18:00 | ----- | 토 론 |

SCIENTIFIC EXCHANGE VISIT

of J. D. Andrade
Professor, College of Engineering
University of Utah
Salt Lake City, Utah 84112

TO

Institute for Macromolecular Chemistry
Prague, Czechoslovakia
Professor J. Kalal
Scientific Director

August 8, 1977 to

August 29, 1977

Background

The Institute for Macromolecular Chemistry in Prague is internationally recognized for its work in the field of synthetic polymers, and particularly for its work on aqueous gel networks for biomedical applications. The Institute is very active in the International Union of Pure and Applied Chemistry (IUPAC) and hosts one or two Microsymposia on Macromolecules each year under IUPAC auspices.

The Institute of Macromolecular Chemistry, one of the Institutes of the Czechoslovak Academy of Sciences, was founded in the late 1950's and moved into its present facility on the outskirts of Prague in 1962. Much of the early work of the Institute was on aqueous gel materials for soft contact lenses. This work came to the attention of the biomedical community in the early sixties with the publication of a key paper (1) and a basic patent (2). The Institute's expertise and technology in these areas has been licensed in the U. S. via agreements with National Patent Development Corp. in New Brunswick, New Jersey. The Institute is still very active in gel materials and soft contact lens and related applications.

Dr. D. Lim, Associate Director for Chemical Sciences of the Institute, was on leave in the United States in 1970-74. He spent several months in 1970 at the University of Utah working with W. J. Kolff on biomedical device development. D. Lim stimulated my interest in gels for medical purposes. In 1974 Lim and his family went back to Czechoslovakia to a very uncertain situation.

In 1975 I organized and chaired a symposium of the American Chemical Society on "Hydrogels for Medical and Related Applications." D. Lim was invited to be a plenary lecturer, but he could not obtain permission to come. He suggested I also invite Professor J. Kalal, the Scientific Director of the Institute, to participate.

Dr. Kalal participated in the Symposium in August, 1975 and visited my laboratory in Salt Lake City after the meeting. We discussed a possible exchange of researchers and collaborative program at the time. My trip to Prague was to be the first step in that collaboration.

The Trip and Visit

I arrived in Prague on Monday, August 7, 1977 in mid-afternoon. Professor Kalal and Milan Houska, one of his associates, were waiting for me (they had been waiting for three hours!). There was no problem getting through passport control. There was no baggage inspection. The exchange scientist visa was accepted without problem, there was no need to exchange any money (this would not be the case, of course, with a tourist visa).

M. Houska took me to the Hotel International, checked me in, saw me to my room, and handed me the stipend in Czech crowns in cash. The Hotel was very nice - my room was a two room suite which was really quite plush. I was informed that the room was maintained by the Hotel for the Czechoslovak Academy of Sciences for visiting foreign scientists. The Hotel was of the Russian "wedding cake" architectural style and apparently catered to Russian tourists.

After a brief checkout on the tram and bus system, Houska and I boarded a tram for the Institute of Macromolecular Chemistry, which was about 4-5 miles from the hotel, roughly 20 minutes by tram.

Houska gave me a brief orientation to the Institute. Then I went to Professor Kalal's office, met Dr. Norman Bikales of the U. S. National Science Foundation who was visiting, and then discussed with Kalal the plans for my visit. He discussed the organization of the Institute and the collaborations with Soviet Institutes, particularly the Bakovlev Institute for Cardiovascular Surgery in Moscow.

Professor Kalal and I agreed that I would spend most of my time becoming familiar with all the research activities in the Institute relevant to my interests.

For the remainder of the week, I talked with as many people as possible, including Kopocek, Houska, Kudela, Spevacek, Brynda, Ulbrich, Shauer, Stoy, Vacik, Nespurek, and Drobnik. During that week I had the pleasure of meeting Professor A. D. Jenkins of the University of Sussex and Professor G. Allan, Imperial College, who gave a lecture on neutron scattering of polymers.

The following week was taken up by a IUPAC Microsymposia on Medical Polymers: Chemical Problems, in which I participated. The symposium was held in the lecture hall of the Institute with the overflow crowd accomodated in a lounge connected by closed-circuit TV to the main lecture

room. The conduct of the symposium was excellent and quite impressive; projection facilities were excellent. The lecture room was very modern and innovative, even though it was about 15 years old. One interesting observation, however, was that, except for the lecture hall, lounge, and public display section of the building, the Institute was off limits to all participants. The doors to laboratory wings of the building were locked. No tours were scheduled or arranged. Participants who indicated an interest in touring the facilities were discouraged from doing so. Only a few participants succeeded in getting a tour; generally only those who succeeded in striking a rapport with a member of the Institute staff and who stayed over for an extra day after the symposium was over. All in all, the symposium was excellent in content and in arrangements. The staff obviously did all it could to make the experience a pleasant and rewarding one for all participants.

The following week I talked with Stol, Schneider, Dusek, Pouchly, Sorm, Stoy, Schultz, Sedlacek, Coupek and in more detail with Vacik, Kudela, Kopocek, Brynda and Houska.

Houska, Brynda, and I also visited the Heyrovsky Institute outside of Prague, which specializes in electrochemical research. The purpose of our visit was to see the surface analysis facility, primarily the x-ray photoelectron spectroscopy equipment. We visited Dr. V. Cermak, a well known surface scientist and a young researcher, P. Mikusik, who is running the facility. The equipment was most impressive: a VG (Vacuum Generator) ESCA* 3 X-ray photoelectron spectrometer equipped with Auger and UV accessories, as well as variable sample temperature capability. The Institute for Macromolecular Chemistry contributed funds for the purchase of the equipment. My task was to attempt to convince Cermak and Mikusik that the examination of organic polymers would not necessarily pollute the high vacuum conditions in the instrument. I also attended a series of lectures by Professor N. Plate on Polymer Analogous Reactions, which were very well presented. Professor Plate is with the University of Moscow, and is a well known, well traveled Soviet polymer scientist.

On the Friday before I left, Professor Kalal and I discussed in some detail a collaboration between the Institute and my laboratory, including exchange of personnel (see letter of collaboration enclosed with this report).

*ESCA: electron spectroscopy for chemical applications.

Leaving the country was no problem. Passport/visa control was rapid, and my baggage was not inspected.

Laboratories

The laboratories I visited were in general well equipped and well stocked. This may be a bit misleading, however, as the Institute I visited has its own "hard" (foreign) currency due to the patent and royalty agreements with the West. I was told that nearly all of the other Institutes of the Czech Academy are not nearly as well equipped.

I was told that specialty chemicals are very difficult to obtain. Radio-labeled chemicals must be custom prepared by one of the nuclear institutes, which is apparently quite impractical. Other research chemicals must be ordered one to two years in advance because of the long delivery times. This, of course, results in considerable over-ordering, wastage, and general inefficiency in research. There are restrictions on ordering chemicals from Western sources. Apparently if it is available from the Eastern bloc, it must be purchased from the Eastern bloc, even if it must be custom made and if delivery is one to two years!

The laboratories were well designed and layed out. Concern for safety was evident.

Personnel

The researchers and support staff I talked with were generally highly competent, well-trained, and of obviously high caliber. Although people were willing to talk about their work, they were not generally very excited or enthusiastic (with several exceptions). I probed this a bit. It appears that there is a mood of mild apathy - work is generally an 8-5 job which is reasonably secure. There is an attitude of not rocking the boat and more or less continuing without any great deviation from what was done in the past. There were several notable exceptions, however; these individuals were obviously highly motivated and stimulated.

There was little collaboration or interaction between research groups; apparently because of potential political problems. I was told by one of the more successful and imaginative researchers that he doesn't

want his people polluted or becoming apathetic by working with others who may be politically rather than scientifically motivated. There is even less interaction between Institutes. Our visit to the Heyrovsky Institute, for example, was largely at my insistence.

I got into a number of frank, open political conversations (only on a one-on-one basis, however) with several people. One bright young scientist had been fired very recently for having signed the Charter of 77. A number of the workers were apparently largely political appointees, including the Institute Director and Scientific Director (Kalal). Those I talked with felt that the U. S. stand on human rights was a good thing and should be continued and publicized, though they doubted it would lead to any immediate changes in Czechoslovakia. They made it quite clear that they want and need contact with western scientists - that is why they work so hard on the IUPAC Prague symposia. They asked me to encourage other U. S. Scientists to visit the Institute.

Travel Tips

A brief investment in learning a little Czech is well worth the effort. I took about four hours of "lessons" from a Czech friend before the visit and utilized a Czech phrase book (M. Fryscak, Say it in Czech, Dover Publications, Inc., 1973) during my stay. Not everyone speaks English, certainly not on the street. Older people generally know German and the younger people all know Russian, though they prefer not to speak it.

A little effort in learning some Czech history also helps one understand the quality and spirit of the Czech people.

U. S. records make very appreciated gifts, especially folk, country and western, jazz, and soul-revival-spiritual music, as well as American classical (Grove, Copland, etc.). Prague is obviously a great place to become acquainted with the music of Smetana and Dvorak - the Smetana and Dvorak museums were the highlights of the tourist side of my stay.

Conclusion

The visit was very useful to me and to my Czech colleagues as well. The areas of particular usefulness are outlined in the attached letter of collaboration. I fully intend to pursue the collaboration and to return to Prague to look after the collaboration.

References

1. O. Wichterle and D. Lim, "Hydrophilic Gels for Biological Use," Nature, 185 (1960) 117.
2. O. Wichterle and D. Lim, "Process for Producing Shaped Articles from 3-D Hydrophilic High Polymers," U. S. Patent 2,976,576; March 28, 1961.
3. O. Wichterle, "Hydrogels," in Encyclopedia of Polymer Science & Technology, 15, 273.

Appendix

Letter of collaboration to Kalal
Letter of Collaboration to Schultz

THE UNIVERSITY OF UTAH
SALT LAKE CITY, UTAH 84112

DEPARTMENT OF MATERIALS SCIENCE
AND ENGINEERING
(801) 581-6863

October 28, 1977

Dr. J. Kalal, DrSc.
Research Director
Institute of Macromolecular
Chemistry CSAV
Heyrovskeho nam. 2
162 06 Prague 616
Czechoslovakia

Dear Dr. Kalal:

Thank you for a most enjoyable and productive visit to the Institute for Macromolecular Chemistry. My stay in Prague was very enjoyable. Please thank all of your colleagues for me for their hospitality and kindness.

During my visit you and I discussed in some detail the possibility of a collaboration between the Institute and my laboratory. The remainder of this letter outlines my views on a collaboration.

My group is studying the hydrogel-water interface using contact angle, streaming potential, ESCA, and reflection fluorescence techniques. We are studying the influence of gel-water interfacial properties on the adsorption of radio-iodinated albumin and fluorescently-labeled albumin from buffer solutions. In our work to date we have utilized primarily methacrylate-ester copolymers of varying water content. Related studies are underway in your group, of course, and I was able to discuss such work with M. Houska. This is a natural area in which to collaborate.

My group, however, has not considered the role of specific functional groups at the gel-water interface on protein interactions. This is an area in which the IMC has considerable expertise. I have strong interests in preparing flat substrates of HEMA derivatized with different functional groups to study the specific role of organic functional groups on protein interactions. Perhaps IMC could produce and characterize such surfaces which then could be surface-characterized by my group. Common organic functional groups, as well as other groups with interesting charge-transfer characteristics, would be of great interest.

Another area of considerable interest is the possible role of micro-regions or domains of different surface properties on the interactions of proteins and cells. For example one could have hydrophilic and hydrophobic domains of sub-micron dimensions which could directly interact with complementary sub-micron structures on cell membranes. Dr. Stoy and I discussed these ideas in some detail. This is a very difficult, but important area of study. One could possibly prepare such micro-structures by vapor-phase methods, such as now used by the semiconductor and microcircuit (integrated circuit)

industry. Another way is to produce such domains by the use of block copolymers or polymer blends which segregate to form micro-domains. The IMC, with its experience in block systems, would be in the best position to produce such surfaces, which my group could characterize to some extent. I think this is a very important study which would utilize the best talents and expertise of both groups.

In summary, we could collaborate in the following areas:

1. Protein adsorption at gel/solution interfaces and the electrochemical study of gel/solution interfaces.
2. Preparation, characterization, and protein adsorption of gel surfaces with different organic functional groups and surfaces of different charge-transfer characteristics.
3. Preparation, characterization, and study of surfaces with surface micro heterogenieties, prepared by controlled block copolymerization methods.

May I suggest that one of your people work in my laboratory for a 6 to 12 month period. I would provide research facilities and supplies, but could not provide salary support. I would like to again visit your Institute to facilitate the collaboration. Perhaps I or one of my co-workers would be able to spend some time working at the Institute in the future.

We could begin the collaboration immediately by exchange of samples and information.

I would appreciate your thoughts and suggestions regarding a collaboration as soon as possible.

Thank you again for a most informative and enjoyable visit. I look forward to visiting the IMC again soon, and to a fruitful and productive collaboration between our laboratories.

Sincerely,



J. D. Andrade
Professor

cc: V. Stoy
J. Kopecek
M. Houska

Enc.: Curriculum Vita

JDA/st

THE UNIVERSITY OF UTAH
SALT LAKE CITY, UTAH 84112

DEPARTMENT OF MATERIALS SCIENCE
AND ENGINEERING
(801) 581-6863

November 7, 1977

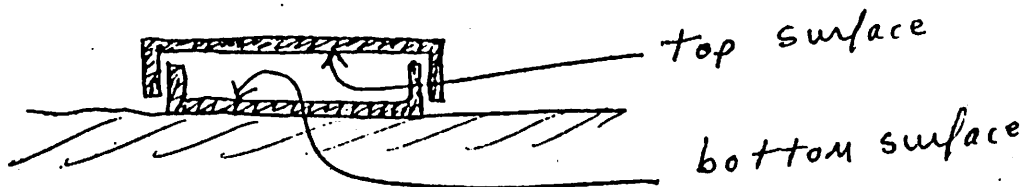
Dr. George Schultz
Institute for Macromolecular Chemistry
Heyrovskeho nam. 2
162 06 Prague 616
Czechoslovakia

Dear Dr. Schultz:

Thank you for your hospitality during my recent visit to the Institute.

We have completed the analyses of your Petri dishes using x-ray photoelectron spectroscopy. Please read the enclosed material called "ESCA User's Kit" to familiarize yourself with the technique and with the analyses of the spectra.

We studied the inside bottom and inside top surfaces of each dish:



Your samples were labeled NO, NH-1, and NH-2.

Please note that the C-1s lines in our spectra are about 279.6 eV, whereas in the "Table of Photoelectron Binding Energies" it is given as 284.0 eV. This is because your samples are insulators. In order to compensate for the positive charge build up, we use an electron flood-gun to neutralize the positive charge. We find that if we over-compensate, i.e. drive the sample to a negative potential with an excess current of flood-gun electrons, our spectra are of optimum resolution. Hence all of the binding energies in our spectra are referenced to a C-1s energy of about 279.6 eV. To compare our spectra with literature values, one should add 4.4 eV to all binding energies in our spectra.

I have included copies of the 50 to 550 eV spectra. All 3 top surface spectra are similar. We chose the 50 to 550 eV region because all of the elements commonly found in synthetic polymers and biopolymers have their major photoelectron lines in that energy range. For example C-1s (284 eV), N-1s (399), O-1s (532), Na-2s (63) [Sodium also has a strong Auger line which appears at roughly 497 eV], Si-2p & 2s (100 and ~151), P-2s (189), S-2s (229), Cl-2s (270),

K-2s (377), etc. Refer to the Table of Photoelectron Bonding Energies included in the ESCA User's Kit.

Refer to the top surface spectrum, labeled as Spectrum A. Note that only two strong peaks are present, one at 278.8 and one at 526.8. The large 278.8 eV line is certainly C-1s and the 526.8 line is O-1s (recall we have to normalize the spectrum to 284.0 for C-1s if we wish to compare the binding energies to those in the literature). The sample surface is thus oxidized to a minor extent. This is evident in Spectrum B, a high resolution spectrum of the O-1s region from 520-540 eV. Note that the O-1s peak is split. The low energy peak (527.36) probably represents ether or hydroxyl oxygen (singly-bonded oxygen); the higher energy point is probably due to carbonyl or ester oxygen (doubly-bonded oxygen). This could be confirmed by high resolution scans and expanded spectra of the C-1s regions. Spectra C and D are the other 2 tops. There is a little less oxygen present in the C and D than in A.

Spectrum E is the NO "bottom" sample. The oxygen peak is much more significant. Nitrogen peaks at 394.0 and 400.4 eV are also evident. Spectrum F presents the nitrogen region in more detail. The 394.6 eV peak is within 1 eV (after normalizing the charging shift to 284.0 eV for the C-1s) of the value reported in the literature for $H_2N-C_6H_5$ (Ref. 1), 399.6 eV. The second Nitrogen peak is ~ 6.2 eV higher in binding energy, which is almost identical to the shift in the literature for the difference between $H_2N-C_6H_5$ and $O_2N-C_6H_4-R$ compounds (Ref. 1). Thus it is safe to say that amino nitrogen and nitro nitrogens are present. The ratio:

$$\frac{NI_2}{NO_2} \sim \frac{10189}{21355} \approx 1:2$$

The O:N ratio can also be determined. When we ratio different elements or different photoelectron lines, we must take into account the sensitivity factors as photoelectric cross-sections. Refer to Section 5 of ESCA User's Kit on Quantitative Analyses - and the Table on "Photoionization Cross-Sections." Note that C-1s has a cross-section of 1.000, N-1s is 1.80, and O-1s is 2.93. Thus to ratio C, N, O, we must divide the area of the N-1s peaks by 1.80 and the O-1s peaks by 2.93. Referring to Spectrum G, the area of the O-1s peak is 100,998; the normalized intensity is then $100998/2.93 = 34,470$. In Spectrum F, the area of the nitro nitrogen (high bonding energy peak) is $21,355/1.80 = 11864$. Some of the oxygen is associated with carbon, however. Using the top surface spectrum as a control (Spectrum D), we find the oxygen area is (see Spectrum H) $14775/2.93 = 5043$. Thus the oxygen associated with nitrogen is probably $34,470 - 5043 = 29,427$. The O:N ratio is then $29,427/11,864 \approx 2.5$. It is likely that the nitration treatment may have resulted in some surface oxidation. Thus it is perhaps reasonable to suspect that the O:N ratio is indeed 2:1 and the "excess" oxygen is due to surface oxidation. This supposition could be checked by high resolution, expanded spectra of the C-1s region. The N:C ratio can also be determined. Spectrum I gives a C-1s area of 229,889. From Spectrum F, we see then that the ratio of C:N is $\sim 7.3:1$, with about 2/3 of the nitrogen being in the nitro form and 1/3 in the amino form. As each repeat unit of polystyrene contains 8 carbon atoms, this suggests that every repeat unit in the surface region is either nitrated or aminated.

NH #1 and #2 bottom spectra were identical. Refer to Spectrum J. There is considerably more oxygen in this spectrum than in the "NO" spectrum. Note also that the nitro:amino nitrogen is roughly in a 1:1 ratio (Spectrum K), so clearly all the nitro groups have not been reduced on the surface. Note the presence of 2 very intense lines in Spectrum J at 482.0 and 490.8 eV. These are the Sn $3d^{5/2}$, $3d^{3/2}$ lines (again recall that all binding energies must be shifted ~ 4.4 eV due to charging before comparison can be made with literature values). Note also that the Sn energies in the Table of Photoelectron Binding Energies are for metallic tin. Ionic Tin would be shifted in energy several eV higher. The identification of Sn is confirmed by the presence of the $4S^{1/2}$ line at ~ 129.2 eV and the 4p line at about 90 eV. Note that these energies are only approximate values due to the low resolution scan conditions. The small peak at 186.0 eV may be due to P; Br could be another possibility. If these elements are suspected, a more detailed study would be necessary to make a definitive identification.

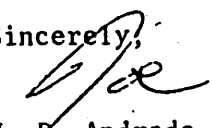
In summary, the untreated surface is largely pure polystyrene with a small amount of surface oxidation. The "NO" treatment results in roughly 1 nitrogen per repeat unit but only 2/3 of the nitrogen is in the nitro form, the remainder is probably in the amino form. If we assume only $-NO_2$ and $-NH_2$ species, then there is some carbon oxidation produced in the treatment. The "NII" surface was apparently produced by reduction of the "NO" material with a tin compound. The reduction was only partial, however, as the "NII" surface contains NO and NH material in an approximately 1:1 ratio. The "NH" surfaces contain quite high concentrations of tin, probably in an ionic form. Any real difference in the biological behavior of the "NO" and "NII" surfaces is probably due more to the presence of tin than to the differences in nitrogen functionality.

I hope this data is of some help to you. I have kept the original spectra, so if you have any questions please write. I have discussed the analysis of the spectra in detail in this letter to assist you in learning how to interpret ESCA spectra. Please show the spectra and letter to Milan Houska as he would probably be interested in it. Please show this also to Professor Kalal, as he is very interested in the collaboration between my laboratory and the Institute for Macromolecular Chemistry.

Please write me and tell me how the ESCA analysis compares with your other data and with the biological evaluation.

Na shledanou!

Sincerely,



J. D. Andrade
Professor

JDA/st

Ref. 1: B. J. Lindberg and J. Hedman, "Group Shifts for N, P and As Compounds," Chemica Scripta, 7 (1975) 155.

February 4, 1987

Professor Vladimir Kubanek, Director
Institute of Macromolecular Chemistry
Czechoslovak Academy of Sciences
Heyrovsky sq. 2
15206 Prague
CZECHOSLOVAKIA

Dear Prof. Kubanek:

I am writing to invite you to visit the Department of Bioengineering, University of Utah, under the scope of our agreement on mutual cooperation, for two weeks in the 2nd and 3rd week of June 1987. Due to the extension of our agreement of cooperation, it is necessary that you, me and Dr. Kopecek discuss together in detail our future cooperation. By that time enough experimental data will be available to permit the discussion of our mutual projects in detail.

During your visit we could officially sign the extension of our agreement into the area of "Modification of biopolymers by water soluble synthetic polymers", which I proposed to you in December, 1986 in coincidence with point 3 of our valid agreement. Since we have just started the second five years of cooperation, I am sure that your visit will contribute to the most effective cooperation in the next five years.

I am aware of your busy schedule. If the proposed date does not fit into your program, please suggest another one. The earliest possible date is the end of May (to have enough preliminary experimental data as a basis for discussion), the other possibility the end of August.

I am sending this invitation both by telex and a letter.

With my best personal regards.

Sincerely,

J.D. Andrade, Ph.D.
Dean

JDA/pk

SUMMARY OF

Discussions Between
Professor J. Kalal
Professor J. Kopecek
and Professor J. D. Andrade
March 4-6, 1987 in Salt Lake City

It was decided to fully implement the Inter-institutional Agreement between the Department of Bioengineering, University of Utah, and the Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences as follows:

Both parties discussed in detail the progress achieved during this agreement and the plans for the next period, since according to point 4, the validity of the agreement was extended until December 31, 1991. It was decided to prepare working plans for shorter periods: 1987-1988; 1989-1990; 1991.

J. Kalal and J. Kopecek will recommend that a direct connection be established between the Institute for Macromolecular Chemistry (IMC) (CSAV) and the College of Engineering (University of Utah) to facilitate the overall agreement, particularly with respect to the exchange and acceptance of visitors from IMC to the University of Utah.

In 1987 and 1988 the research will concentrate on areas proposed by both institutions, i.e. "modification of biopolymers by water soluble synthetic polymers." However, it is understood that there are further areas in which both parties can collaborate. Those areas will be defined in the next working plan for the years 1989, 1990, and 1991.

It was agreed that exchange of scientists and students in both directions is an important factor for the success of the collaboration project. Professor Andrade stressed that the extension of the stay of Dr. J. Kopecek until December 31, 1987 and the six-month visit of Dr. P. Kopeckova in the same year will contribute to the formation of the necessary experimental basis for future cooperation. In the year 1988, Professor J. D. Andrade will pay a visit to the Institute of Macromolecular Chemistry, and one or two graduate students will visit Prague to work on mutual projects for a period of 3-6 months.

Dr. J. Andrade (Dean of the College of Engineering) and Dr. P. Gerity (Assistant Dean for Industrial Relations) informed Dr. Kalal of the technology transfer and economic development activities of the University of Utah, including the State of Utah Centers of Excellence economic development program. The Centers in the College of Engineering may be helpful in arranging contacts between United States industry and CSAV.

The University of Utah expects to have participants at the 1989 Prague Microsymposium and at the 1992 IUPAC Macrosymposium. The University of Utah expects to send faculty and/or students to work at IMC for three to six months each year, beginning in mid-1988 for the 1988 and 1989 period. These guests will be faculty or students who worked closely with Professor Kopecek or Dr. Kopeckova at the University of Utah.

It is expected that one or more IMC researchers will work in Utah from three to six months each year and one or more University of Utah researchers will work at the IMC each year. In 1987, the IMC researchers in Utah are Visiting Professor Kopecek and Dr. Kopeckova. Dr. Kopecek's teaching in the Department of Bioengineering and Department of Pharmaceutics was reported by Dr. D. Christensen (Chairman of Bioengineering) to

be excellent and in high demand by the students. The course will be repeated in Fall, 1987 in order for all students to have the proper understanding of the activities of Dr. Kopecek and of the IMC. In the summer of 1988, one or more Utah researchers would work in Prague.

It was stated that the areas of expertise of both parties are complementary and thus form a sound basis for a fruitful and successful cooperation during the validity of this agreement. This complementarity was expressed during the Visiting Professorship of Dr. J. Kopecek, both in teaching activities and in targeted basic research in the areas of polymers with photocleavable bonds (applicable in biosensors and drug delivery), copolymers of hydrophilic and hydrophobic comonomers (for studying surface adsorption on biomaterials and cells), copolymers for the study of the regulation of ligand-receptor binding and copolymer-containing drugs bound via azobonds for site-specific release in the colon.

Czechoslovak guests in Salt Lake City would learn of the ideas and activities in medical and biopolymers at the University of Utah, including University of Utah and State of Utah initiatives in technology transfer and economic development.

Utah guests in Prague are expected to learn of the special science organization and activities of the CSAV and become acquainted with the literature and accomplishments of Soviet and other Socialist scientists.

J. Kalal
Vice Director for Science
Institute for Macromolecular Chemistry
Czechoslovak Academy of Science

J. D. Andrade, Ph.D.
Dean, College of Engineering
University of Utah

March 5, 1987

~~KOPECEK~~
18

21 July 1987

Professor V. Kubanek, Director
Institute of Macromolecular Chemistry
Czechoslovak Academy of Sciences
Heyrovsky sq. 2
16206 Prague 6
CZECHOSLOVAKIA

Dear Professor Kubanek:

We have enjoyed and benefited from the visits of Dr. J. Kalal and Dr. K. Dusek. The work of Dr. Kopecek is progressing very well, and we are all learning from each other's expertise.

Enclosed is a proposed working plan for our collaboration for the year 1987-1988. The research plan is in accordance with the proposal I sent to you by telex last December 1, 1986 and with the research we are doing with Drs. Kopecek and Kopeckova. According to our Agreement and the Summary of Discussions with Drs. Kalal and Kopecek in March, 1987, the exchange of coworkers in both directions is a pre-requisite for the success of the collaborative project.

For the next year, I am nominating Mr. Hung-Ren Yen and Miss Nancy L. Krinick each for 12 weeks. Both are graduate students who are working closely with Dr. Kopecek. Mr. Yen works on polymers with photocleavable bonds and on the interaction of released ligands with monoclonal antibodies. Ms. Krinick is working on photoactivatable drugs and on the binding of biopolymers to water soluble macromolecules and to surfaces via photocleavable bonds. Both projects are important for scientific, as well as applied purposes, including the development of biosensors and photodynamic immunotherapy.

May I suggest April 3, 1988 as the arrival date in Prague for Mr. Yen and Ms. Krinick. I would like to use the remaining 2 weeks of the exchange allotment for my own visit to your Institute to continue the discussions and collaboration with you, Dr. Kopecek, Dr. Kopeckova, Dr. Kalal, and others in the summer of 1988. I believe that it is important to let you know that Ms. Krinick will travel on a USA passport, whereas Mr. Yen, who arrived in the USA three years ago, still has a passport from the Republic of China (Taiwan).

Dr. Kopeckova has started her work on the modification of biopolymers with water-soluble copolymers, as well as on the modulation of ligand-receptor binding. The research goes very well, and we would like to finish this project before she returns to Prague. However, I have obtained new laboratories and due to their reconstruction there will be a time period when experimental work will not be possible. I would appreciate very much, therefore, if her stay could be extended until the end of this year.

I would again like to extend to you an invitation to visit our department and discuss our future cooperation. After visiting all our facilities, you will get a clear picture of our scientific interests, equipment and cooperative activities, both with academia and industry, which will help you in planning future collaborations.

With my very best personal regards,

Sincerely,

J. D. Andrade, Ph.D.
Dean

JDA/ag

cc: Dr. J. Kalal
Dr. J. Kopecek

encl

21 July 1987

Professor V. Kalal
Institute of Macromolecular Chemistry
Czechoslovak Academy of Sciences
Heyrovsky sq. 2
16202 Prague 6
CZECHOSLOVAKIA

Dear Professor Kalal:

Thank you for your letter of April 29, 1987. I am pleased that you enjoyed your stay in Salt Lake City. I strongly believe that our discussions contributed to the strengthening of our collaboration. I hope that we can continue our discussions during my planned visit to Prague in the summer of next year.

Enclosed is a copy of the Working Plan for 1987-88, which I have mailed to Professor Kubanek. According to our Summary of Discussion and our Agreement on Cooperation, I am nominating Mr. Yen and Miss Krinick to work with Dr. Kopecek in Prague for 12 weeks each. I was informed by Dr. Kopecek that the Institute was planning to nominate Dr. Brynda for a 24-week stay. He will be most welcome, and I look forward to working with him.

During my stay in Prague, we should discuss the extension of our collaboration into other areas and the Working Plan for the Years 1989 through 1991.

I wish you a pleasant summer holiday!

Sincerely,

J. D. Andrade, Ph.D.
Dean

JDA/ag

encl

cc: Dr. V. Kubanek
Dr. J. Kopecek

1987-88 WORKING PLAN

Interinstitutional Cooperation Agreement Between

the Institute of Macromolecular Chemistry,
Czechoslovak Academy of Sciences and

the Department of Bioengineering, University of Utah

TOPIC: MODIFICATION OF BIOPOLYMERS BY WATER SOLUBLE SYNTHETIC POLYMERS

AIMS:

1. To understand, predict and control the interactions of modified biopolymers (proteins, allergens, immunoglobulins) with cells and other surfaces.
2. To investigate the regulation of ligand-receptor binding by chemical modifications of biopolymers and by changing the local solution microenvironment, which influences conformation and binding.
3. To model the role and effect of such regulations on immuno and other specific binding processes.

SPECIFIC TASKS:

1. Synthesis of water soluble synthetic polymers containing reactive groups: copolymers of N-(2-hydroxypropyl)methacrylamide and polyethyleneglycols containing different functional groups at both chain ends.
2. Modification of biopolymers with polymers synthesized in 1. above, optimizing the binding reactions to minimize the loss in biological activity.
3. Evaluation of the physicochemical and biological properties of modified biopolymers in vitro and in vivo.

EXCHANGE OF COWORKERS IN 1988 (26 weeks each under the Agreement; further exchange exceeding this limit has to be paid by the side interested):

Prague - Salt Lake City: Professor V. Kubanek (2 weeks; either 1987 or 1988)
Dr. E. Brynda (24 weeks)

Salt Lake City - Prague: Dr. J. D. Andrade (2 weeks)
Mr. H-R Yen (12 weeks)
Ms. N. L. Krinick (12 weeks)

Professor V. Kubanek, Director
Institute of Macromolecular Chemistry

Professor J. D. Andrade
University of Utah

Visit of prof. V. Kubánek and Dr. J. Vacík

- Oct. 20 8.25 p.m. arrival in Salt Lake City, Northwest, flight 677
- Oct. 21 8.00 a.m. breakfast at Peery hotel with J. and P. Kopecek
9.00 a.m. discussion with prof. Sung Wan Kim - CCCD
9.45 a.m. tour of CCCD
11.30 a.m. discussion with prof. J. D. Andrade
12.00 a.m. lunch at Panorama room with Drs. J. D. Andrade, S. W. Kim, J. and P. Kopecek
1.30 p.m. pick up of car at Alamo (37 N, 2400W, confirmation # 276 4940; phone 539-8780)
2.30 p.m. leaving for Grand Canyon with Drs. P. Kopecková, E. Brynda and L. Fornusek
- Oct. 22 Grand Canyon. Reservations at the Yavapai Lodge, 3 rooms in Pavla's name; reservation # Y 74069. Check at the arrival if there is a vacancy at Bright Angel Lodge.
- Oct. 23 return to Salt Lake City, Peery hotel
- Oct. 24 morning Dr. Vacík leaves for Irvine, California (flight ?)
9.00 a.m. meeting with prof. Higuchi at Skaggs Hall
10.30 a.m. cooperation discussion with prof. J. D. Andrade, MEB
12.00 a.m. lunch at Panorama room
1.30 p.m. discussion with prof. Christensen, MEB
2.15 p.m. tour of MEB
7.00 p.m. evening in prof. Kim's house
- Oct. 25 8.00 a.m. breakfast with prof. Andrade at Peery hotel
8.30 a.m. visit of the Division of Artificial Organs
10.00 a.m. return to MEB
10 a.m. - 4 p.m. Dr. Brynda, Nancy Krinick and Homer Yen
4 - 6 p.m. discussion with prof. Andrade
6.30 p.m. farewell dinner with prof. Andrade, P. and J. Kopecek
- Oct. 26 morning prof. Kubánek leaves for Irvine, California (flight ?)

Prague 6 - Pefřiny, Czechoslovakia
Prague 353 341 (phone)
Macro Prague (cable)
116/064 (telex)

October 30, 1987
15-29/87-6/02

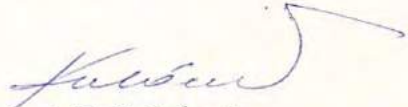
Prof. J. D. Andrade, Ph.D.
Dean
College of Engineering
The University of Utah
2000 Merrill Engineering Building
Salt Lake City
Utah 84112
USA

Dear Professor Andrade:

I would like to express my thanks for your letter dated July 21 which enclosed proposed working plan for our collaboration for the years 1987-1988. As you know we do not have any objections against all your proposals but we have to consult them with our authorities before I can sign them. That is also the reason for a delay in answering. Enclosed you will find six copies of the working plan. I would appreciate to get three of them back for our file after your signature. In the moment we do not see any problem with the proposed arrival date, April 3, 1988 for your Mr. Yen and Ms. Krinick. Of course, we shall be delighted to see you personally in our Institute. Actually, the personal contacts are really invaluable for successful continuation of our collaboration. From the same reason I would appreciate to meet you in Salt Lake City next year as well.

With my very best personal regards,

Sincerely,


Prof. V. Kubánek

Director

Enclosures



December 29, 1987

Professor V. Kubanek
Director, Institute of Macromolecular Chemistry
Czechoslovak Academy of Sciences
Heyrovsky sq. 2
16206 Prague 6
Czechoslovakia

Dear Professor Kubanek,

Thank you for your letter from October 30, 1987 and for the enclosed Working Plan. I am returning three signed copies. I am delighted that our future cooperation was approved by the authorities. I strongly believe that our cooperation is an example of a cooperation which is mutually beneficial to both parties involved. I am looking forward to your visit to the University of Utah in 1988 as well as to my visit to Prague. Both of these visits will help in planning our collaboration for a long period. The visits of Mr. Yen and Miss Krinick in Prague and Dr. Brynda's in Salt Lake City will contribute to further progress in the experimental work, so necessary for continued and future progress.

The visits of Dr. J. Kopecek and Dr. P. Kopeckova were extremely successful. They both clearly demonstrated the high level of Czechoslovak science. I am sure that they will inform you in detail about the scientific results obtained. A number of joint publications are already submitted and in press. Many others are now being prepared. It has been a most stimulating and productive association and cooperation.

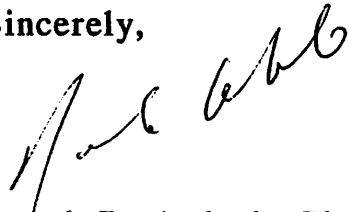
Dr. J. Kopecek is at the present time Chairman or Member on the Supervisory Committees of 9 graduate students in Bioengineering, Materials Science (Polymers), and Pharmaceutics. He is also an Adjunct Professor at three Departments of the University of Utah. Needless to say this reflects the value of his stay here. For the

Department of Bioengineering
2480 Merrill Engineering Building
Salt Lake City, Utah 84112
(801) 581-8528

fulfillment of our Agreement and continuation of research under way, it is necessary that he spend 3 months in 1988 at the University of Utah. I take the liberty to ask you for the support of his visit. We have planned Supervisory Committee meetings and Defenses of Theses for the planned period of his stay (July 18 - October 17, 1988). I am writing a separate letter of invitation to Dr. J. Kopecek. In this connection I would like to raise another point. As you know, the students here have to pay the costs of their study (tuition) from their own pocket. It would be fair to the students, who believed that Dr. Kopecek would stay for 3 years, as previously planned, if they work with Dr. Kopecek at least part time in the final stages of the preparation of their Theses. Dr. Kopecek's visit in July - October would permit these students to continue to benefit from his teaching and research supervision. The postponement of their Defense would be too hard on them.

I strongly believe that our cooperation will continue to flourish in the years to come. I wish you all the best for a peaceful and successful New Year and look forward to welcoming you to Salt Lake City in the very near future.

Sincerely,



Joseph D. Andrade, Ph. D.
Professor

JDA/jpa

Encl.



January 5, 1988

Dr. K. Firtova
Head, Foreign Department
Praesidium of the Czechoslovak
Academy of Sciences
Narodni 3
11142 Prague 1
Czechoslovakia

Dear Dr. Firtova,

Re: Interinstitutional Cooperation Agreement Between the Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences and Department of Bioengineering, University of Utah.

According to point 3 of this Agreement, to the Summary of Discussions with Prof. J. Kalal and the 1987-1988 Working Plan (all enclosed), I am nominating the following scientists to work with Dr. J. Kopecek at the Institute of Macromolecular Chemistry, CSAS, Prague in 1988:

- 1) Professor J. D. Andrade (3 weeks) from Feb. 5-8 and June 28 - July 16, 1988
- 2) Mr. H.-R. Yen (12 weeks) from April 5 to June 27, 1988
- 3) Miss N. L. Krinick (12 weeks) from April 5 to June 27, 1988

During this visit work will continue on projects covered in the Agreement and working plans for the next period (1989-1990) will be discussed.

I hope you have a pleasant new year.

Sincerely yours,


Prof. J. D. Andrade

JDA/jpa

cc: National Academy of Sciences of the USA
Prof. V. Kubanek
Prof. J. Kopecek

Enclosures (3)

Department of Bioengineering
2480 Merrill Engineering Building
Salt Lake City, Utah 84112
(801) 581-8528

INSTITUTE OF MACROMOLECULAR CHEMISTRY
CZECHOSLOVAK ACADEMY OF SCIENCES

Prague 6 - Petřiny, Czechoslovakia
Prague 353 341 (phone)
Macro Prague (cable)
116/064 (telex)

March 14, 1989

Joseph D. Andrade, Ph.D.
Professor and Chair
Department of Bioengineering
2480 Merrill Engineering Building
Salt Lake City
Utah 84112
USA

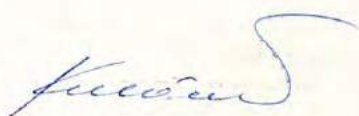
Dear Joe,

My best wishes to you and Professor Kim. You may remember that in my New Year letter I promised to write you in the matter of Dr J. Kopeček later in the year. As you certainly know, his unfounded demand of an extended stay in USA, and the "pressure tactics" he used throughout caused many difficulties, both to the Institute and in particular. Dr Kopeček did not respect the valid Czechoslovak rules, nor did he consider interests of the organization which employs him, and he has undertaken commitments in USA to which he was not entitled.

In spite of all the transgressions just mentioned both of legal and social, I have recommended to Academician Říman that he should approve the extension of Dr Kopeček's stay at the University of Salt Lake City till the end of 1990, in the mutual interests of continuing our cooperation. I would like to use this occasion and ask you and Professor Kim to assist me by pointing out to the respective institutions in USA that they should respect Czechoslovak law and not offer to Czechoslovak citizens stays or appointments without the approval of the Czechoslovak authorities, as this was the case with Dr J. Kopeček since such proceedings are at variance with our agreement. Decent international relations can have a firm basis only if they are founded on mutual respect for the laws and rules of cooperating countries or organizations. Only thus can contacts between scientists and scientific institutions of various countries be successfully developed for mutual benefit, thus contributing to a good political ambience in the world.

I would be grateful if you, as the initiator of our agreement on cooperation, could take a matter-of-fact standpoint in this matter.

Sincerely yours,

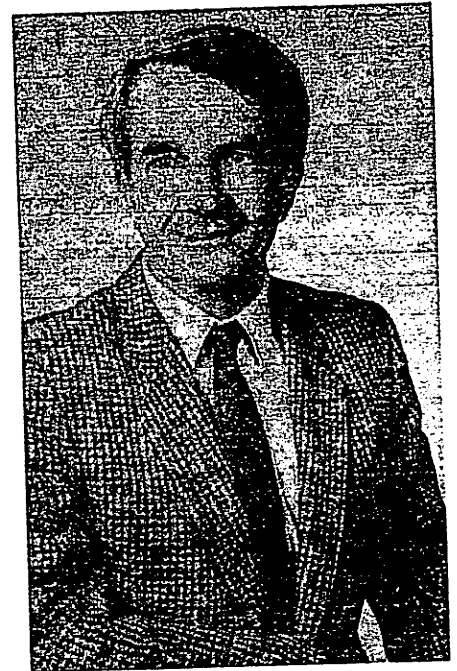

V. Kubánek

New Faculty

Welcome to the University of Utah!

Professor Jindrich Kopecek

Professor of Bioengineering
Professor of Pharmaceutics



*not that sure, was
and still is on the staff.*

The Departments of Bioengineering and Pharmaceutics are pleased to announce the joint appointment of Dr. Jindrich Kopecek as Professor of Bioengineering and Pharmaceutics effective January 1, 1989.

This appointment will augment and expand the growing interaction and collaboration between the Departments of Bioengineering and Pharmaceutics.

Jindrich Kopecek attended the Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences in Prague and received a Ph.D. degree in 1965 in polymer chemistry. He joined the staff of the National Research Council of Canada, Division of Applied Chemistry, as a Postdoctoral Fellow in 1967. Today, his main scientific interests are: biocompatibili-

ty of polymers, biodegradability of polymers, and drug delivery systems.

Dr. Kopecek was a pioneer in the development of polymeric drug carrier systems. Polymeric anticancer drugs developed in his laboratory in Prague have been approved for clinical trials in the United Kingdom.

Dr. Kopecek serves on the editorial boards of seven scientific journals; and has been an invited speaker at numerous international meetings. He is the author or coauthor of 140 original scientific papers, 23 reviews or chapters in edited books. Over 30 patents have been issued in his name.

At the University of Utah Dr. Kopecek will teach graduate courses in Bioengineering and Pharmaceutics. As

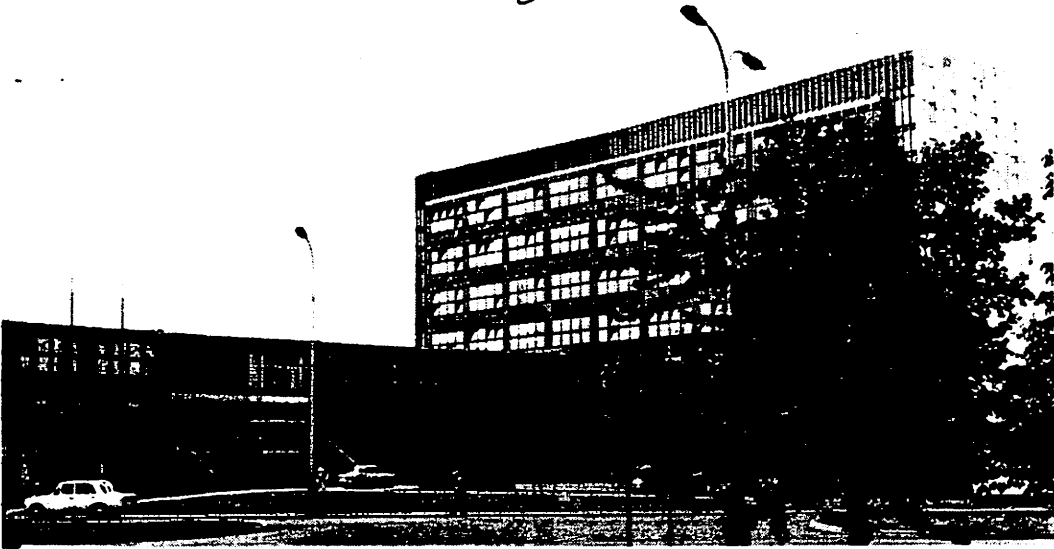
Visiting Professor in 1986/87 he taught a Biocompatibility course for Bioengineering which was highly received by the students.

His research activities are well underway. With a core of graduate students and the funding from federal agencies and industry he is well prepared to contribute to the University. In the short time he has been associated with the University of Utah he has one patent pending and three patent disclosures. He is a member of the Center for Biopolymers at Interfaces, and Co-Director of the Center for Controlled Chemical Delivery (CCCD).

Welcome, Dr. Kopecek! We look forward to working with you.

Czechoslovakia (21)

1987



applied in medicine as well as in industry. That is why we are interested in pooling our efforts with other workplaces in Czechoslovakia and abroad," Professor Vladimir Kubánek, the Director of the Institute, answered my question concerning their international cooperation. "Of the total of 440 employees, almost a half travel abroad for shorter stays every year, and 10 of them for one year stays in the Soviet Union, Japan, the USA, Great Britain and other countries.

"Since 1971, we have been carrying out research into the use of polymers in medicine in cooperation with our colleagues in the Soviet Union. That programme, which is being coordinated by a bilateral agreement between the Academy of Sciences, and which received in 1977 a joint award of the presidiums of the two academies, has been gradually joined by research institutes in Bulgaria, Hungary, Poland and the German Democratic Republic.

"As far as long-term cooperation with scientific workplaces in the capitalist countries is

NEITHER OF US COULD DO IT ALONE



2 I entered the world of transparent beakers, flasks and test-tubes and all sorts of measuring instruments handled by people in white coats and discussing the effect of the ring size and substitution on the reactivity of lactams under the conditions of hydrolytic polymerization, or

how to obtain polymer particles of submicron dimensions by emulsifier-free microsuspension polymerization . . .
I was at the Institute of Macromolecular Chemistry of the Czechoslovak Academy of Sciences, one of the largest institutes belonging to the Academy and also one of the largest non-industrial research centres in the sphere of polymers in the world.
"Our tasks are multiform. You certainly know that macromolecular chemistry is extensively

concerned, we have also achieved significant results which have become the property of both sides. I think my colleagues, Jiří Vacík, Jindřich Kopeček, Rudolf Lukáš, František Rypáček, and Pavel Kratochvíl could inform you best about that, for they took part directly in the work on individual problems . . ."

IN THE LABORATORIES

My first interview at the Institute of Macromolecular Chemistry was with Jiří Vacík head of the laboratory of contact lenses and polymers in medicine.
As far as I know, the gel contact lenses are a Czechoslovak invention which was born in your laboratory . . .

"You are right. We have been working in the research of contact lenses from the moment of the foundation of this institute in 1958, and it was the idea of Academician Otto Wichterle to use hydrogels from poly(2-hydroxyethylmetacrylate) which is biocompatible and has excellent parametres in terms of light transmittance.

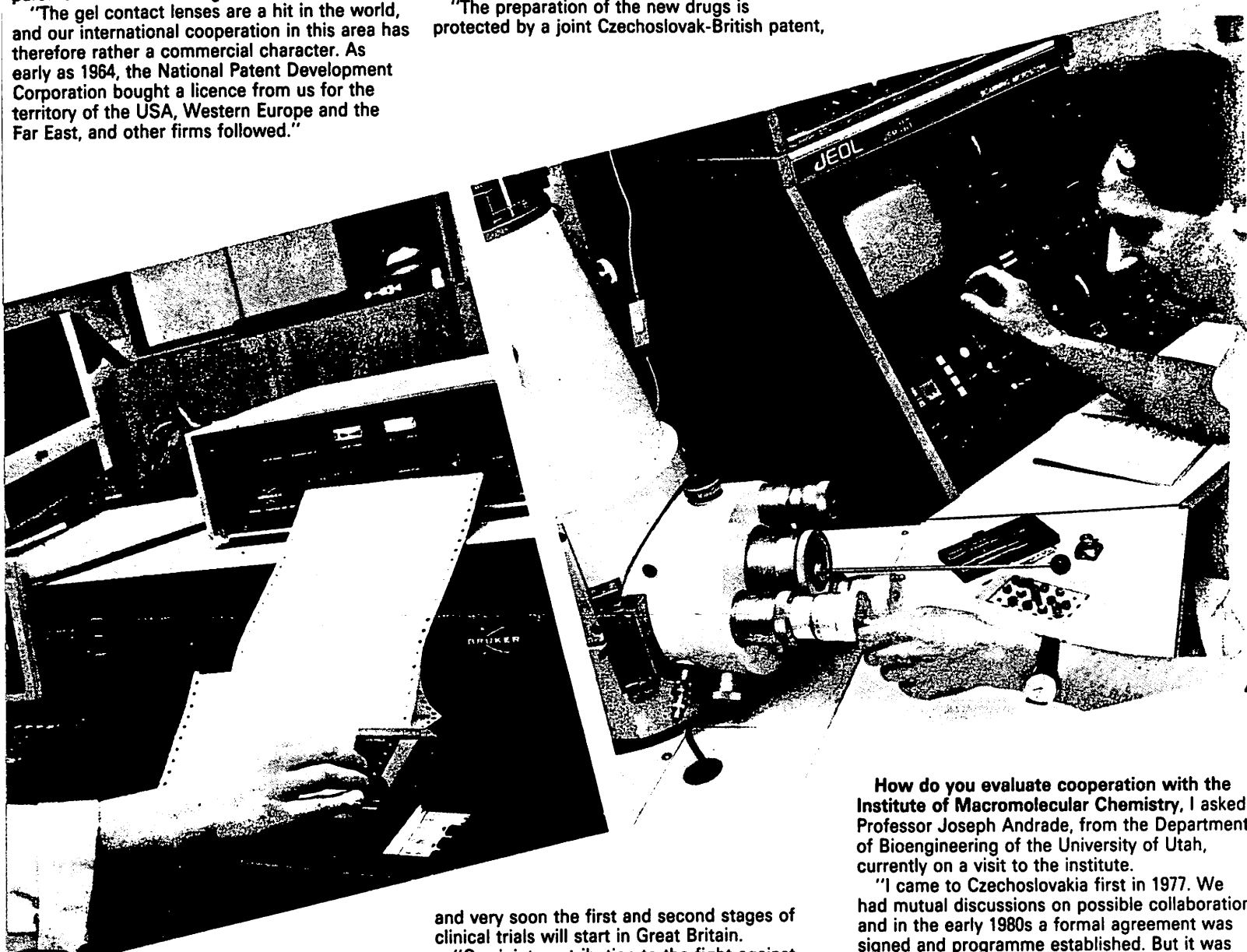
"The gel contact lenses are a hit in the world, and our international cooperation in this area has therefore rather a commercial character. As early as 1964, the National Patent Development Corporation bought a licence from us for the territory of the USA, Western Europe and the Far East, and other firms followed."

development of new forms of anti-cancer drugs in cooperation with the Department of Biological Sciences of the University of Keele in Great Britain.

How is joint research in the Prague and Keele workplaces proceeding? I asked Jindřich Kopeček.

"The preparation of the new drugs is protected by a joint Czechoslovak-British patent,

example, has had more experience with polymer synthesis, while the University of Utah has been more successful in the application of the results of basic research in practice."



In 1986, research into intraocular lenses implanted in the front or the back part of the eyeball for those suffering from cataracts has been part of the contact lenses programme. Does that product enjoy similar popularity in the world?

"In this sphere we cooperate with the American Hydron company, a division of the National Patent Development Corporation, which has agreed a two-year option with us on the basis of our patents, and it should now decide whether it will buy a licence or not.

"Last year we established contact with the Vista Optica firm in Great Britain which is interested in several of the themes on which our laboratory works, starting with the production of 2-hydroxyethylmetacrylate and ending with eye measuring devices."

At the other end of the corridor is the laboratory of biodegradable polymers where I met its head, Jindřich Kopeček. This laboratory has been involved in the

and very soon the first and second stages of clinical trials will start in Great Britain.

"Our joint contribution to the fight against cancer is the linking of anti-cancer drugs with water-soluble polymers thus achieving an increase in their concentration (and consequently effect) in the cancer tissue. Other tissues are affected by the drug to a much lesser degree than was the case before. The new drugs are therefore much safer with reduced side effects."

You are also cooperating actively with the University of Utah, the world's top workplace in the sphere of biomaterials. What is the problem you are dealing with together with them?

"We are preparing special polymers for application in biosensors capable of measuring the concentration of small quantities of biologically active substances in the blood, toxic substances in waste water, etc. Another project involves the preparation of new drugs, effective only in a specific part of the gastro-intestinal tract.

"The greatest asset of all our projects is the fact that the specializations of the two teams are complementary to each other. Our institute, for

How do you evaluate cooperation with the Institute of Macromolecular Chemistry, I asked Professor Joseph Andrade, from the Department of Bioengineering of the University of Utah, currently on a visit to the institute.

"I came to Czechoslovakia first in 1977. We had mutual discussions on possible collaboration and in the early 1980s a formal agreement was signed and programme established. But it was really in the last two years, with the visit of Dr. Kopeček to Utah and his lectures that the joint work really began because his synthetic chemistry expertise was just fantastic.

"Collaboration with the Institute of Macromolecular Chemistry has been very helpful for us because the institute here has an international reputation and experience in synthetic polymer chemistry and polymer science in general. It is important to work together in new areas in science which neither of us could cope with alone. For instance it would be very difficult for us to develop the level of synthetic hydrophilic polymer experience that you have here. It's much easier to collaborate."

1. The Institute of Macromolecular Chemistry
2. Jindřich Kopeček (left) and Joseph Andrade in the laboratory
3. Using a spectrometer to analyse the structure of materials
4. Work with the electron microscope

Photos: M. Balda and ČTI



November 14, 1988

Ms. Lynn Strother
Managing Editor
Medical Devices and Diagnostic Industry
2416 Wilshire Boulevard
Santa Monica, CA 90403

Dear Ms. Strother:

On October 24, 1988, I interviewed Dr. Vladimir Kubanek, Director for the Institute of Macromolecular Chemistry in Prague, Czechoslovakia. Enclosed is a copy of the results of that interview for your consideration for publication in MDDI.

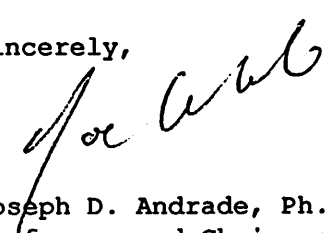
I also sent a copy to Dr. Kubanek, in Prague, for his review. The interview copy has also been reviewed by Dr. J. Kopecek.

I do not anticipate that Dr. Kubanek would have any changes. If you think the material is suitable, we can proceed with plans for publication.

I have also enclosed a photograph of the institute in Prague, provided by Dr. Kubanek.

Please let me know if you need any additional information.

Sincerely,



Joseph D. Andrade, Ph.D.
Professor and Chairman

Enclosures

cc: E. Brynda
J. Kopecek
V. Kubanek

JDA/79/cf

Department of Bioengineering
2480 Merrill Engineering Building
Salt Lake City, Utah 84112
(801) 581-8528

International Technology Transfer: Alive and Well in Czechoslovakia An Interview with Professor Vladimir Kubanek

Director, Institute of Macromolecular Chemistry, Prague, Czechoslovakia

Interest in international technology transfer is on the rise, and in this era of *glasnost*, U.S. firms are entering into an increasing number of agreements with Eastern Bloc countries. But for the Institute of Macromolecular Chemistry of the Czechoslovak Academy of Sciences in Prague, international technology transfer is hardly a recent phenomenon. The soft contact lens was invented there 20 years ago by the institute's first director, Professor Otto Wichterle, who is still active in the field.

Founded in 1959, the institute ranks among the largest in Czechoslovakia, and it is one of the world's most extensive non-industrial centers of basic research in polymer science. Its major objective is the study and development of the chemistry, physicochemistry, and physics of macromolecules, particularly synthetic polymers. As evidenced by its development of the soft contact lens and other applications, the institute has had a long history of discovering uses for polymers in medical devices.

MD&DI editorial board member Joseph D. Andrade, PhD, professor of bioengineering materials at the University of Utah, conducted the following interview with the institute's current director, Professor Vladimir Kubanek, during Kubanek's recent visit to the United States.

MD&DI: Professor Kubanek, how were soft contact lenses developed at the Institute of Macromolecular Chemistry?

KUBANEK: As you know, the first contact lenses were made from hard materials—mineral glass or hard plastics. No other suitable materials were available at the time, and these hard materials controlled the market for about 50 years.

The discovery of the first material for soft contact lenses wasn't made with that application in mind. Rather, it was discovered in an attempt to solve a wider problem—finding a material of optimum compatibility with living tissue.

In 1954, Professor Otto Wichterle and Professor Drahoslav Lim synthesized hydrophilic gels by the copolymerization of 2-hydroxyethyl methacrylate and ethylene dimethacrylate. In 1961, Professor Wichterle (who was then director of the institute) developed the technology for soft contact lens production.

He used a procedure that the specialists in optics at that time regarded as absurd and unrealistic—polymerization in open, rotating molds. In the same year, he prepared the first 5000 soft lenses, which were tested in clinics.

MD&DI: How long after the clinical trials was the soft contact lens technology transferred to the United States?

KUBANEK: In fact, very quickly. The economic consequences of the new discovery soon became clear, and the license was sold to the National Patent Development Corporation in the United States. Later, several follow-up license agreements were signed with companies in other countries.

MD&DI: Is the institute still active in the contact lens field?

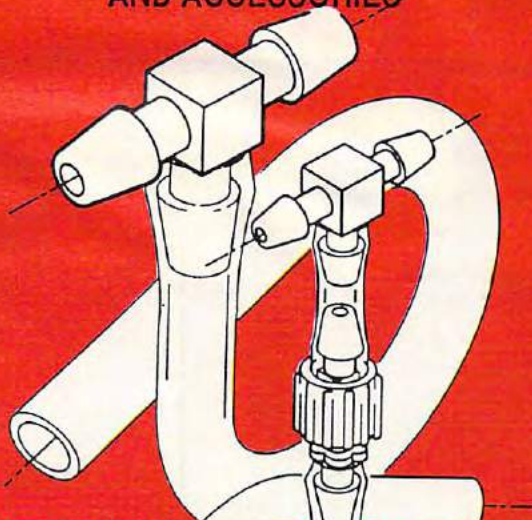
KUBANEK: Yes, we are continuing our strong emphasis on the development of polymers and systems for new generations of contact and intraocular lenses.

MD&DI: What about other medical device applications?

KUBANEK: The institute's Department of Special Polymers, under the direction of Professor Jaroslav Kalal, focuses on the development of polymers and materials for a wide variety of medical and related applications. For example, work is progressing on the synthesis of polymer particles of submicron dimensions for medical diagnostic and pharmaceutical use. The development of hemoperfusion and plasmaperfusion devices for detoxification is under way, as is work on membranes for various separation applications. New hydrogels are being developed for such medical uses as synthetic emboli, medical aids for otolaryngology, and breast prostheses. Research is also progressing on polymer coatings for the improvement of hemocompatibility, and there are a number of other pharmaceutical applications in development as well.

MD&DI: How is the institute able to carry on so many varied polymer studies and applications?

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Prague's Institute of Macromolecular Chemistry

KUBANEK: We are a very large institute, probably one of the largest polymer research and development facilities in the world. In addition to its medical areas, the institute has a number of other major departments dealing with basic research in polymer synthesis and characterization, processing, and engineering. All major disciplines in polymer science are represented at our facility, so we have an enormous technical base and strength from which to draw.

MD&DI: Has your program of international cooperation and exchanges with the United States and other Western countries continued?

KUBANEK: Yes. We've had a long collaboration with the University of Utah in the area of protein adsorption, biosensors, and drug delivery. We also collaborate with the University of Kentucky, the University of Washington, and the University of Massachusetts. For 10 years we worked with the University of Keele in the United Kingdom on the development of targetable polymeric cancer drugs.

Of course, we have many scientific contacts with the Soviet Union and within Czechoslovakia itself. In the Soviet Union, we work with the Institute of Macromolecular Compounds in Leningrad, the Institute for Petrochemical Synthesis in Moscow, the Institute for Chemical Physics and Biophysics in Tbilisi, and the Institute of Cardiovascular Surgery in Moscow.

We feel that collaboration with biological and clinical groups is essential for our biomedical polymer program, since we concentrate only on the chemical and biochemical aspects of the research.

MD&DI: Do political and diplomatic considerations make it difficult for researchers at the institute to exchange information with their Western counterparts?

KUBANEK: Not at all. The Czechoslovak government—and the institute itself—are very supportive of contacts, interaction, and international technology transfer. The institute sponsors a number of symposia, conferences, and smaller meetings each year, and I would urge your readers who might be attending such symposia to contact us for further information.

Interest in technology transfer has increased in the past several years, and I want to emphasize that the procedures for technology transfer have been greatly simplified and improved during that period. Our institute and our government are eager to further such interaction.

For more information on the institute's activities, contact Professor Kubanek at the Institute of Macromolecular Chemistry, Czechoslovak Academy of Sciences, 16206 Prague 6, Czechoslovakia. ■