

Priyadarsi De, Ph. D.

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With strong background in Polymer Science and Physical Chemistry I am seeking a position that allows me to apply my expertise in polymer/organic synthesis and characterization, to work as a team on demanding problems, product development and analyses, while broadening my skills.

Education, Research and Qualifications:

Post-doctoral Research:

January, 2007 – Present

Department of Chemistry, Southern Methodist University, Texas, USA
Application of ATRP, RAFT Polymerization, and “click” chemistry to the drug delivery, Polymer Brush, and Protein-polymer bioconjugates
(Supervisor: Professor Brent S. Sumerlin)

March 2002– December, 2006

Polymer Science Program, Department of Chemistry, UMASS Lowell, USA.
Kinetic and Mechanistic Studies of Living Cationic Polymerization
(Supervisor: Professor Rudolf Faust)

Ph.D.

August, 1997- March, 2002

Indian Institute of Science, Bangalore, India.
Thesis Title: Studies on the Synthesis and Physico-Chemical Properties of Polyperoxides and Copolyperoxides
(Advisor: Prof. D. N. Sathyanarayana)

Experience and Research Skills:

January, 2007 – Present: Post-doctoral Research Associate, Southern Methodist University, Texas, USA

- (1) Synthesis of Boronic acid polymers and block co-polymers by RAFT polymerization for controlled delivery of Insulin.
- (2) Synthesis of Molecular Bottle-Brushes via ATRP and RAFT polymerization.
- (3) Protein-polymer bioconjugates by “grafting to” via “click” chemistry and “Grafting from” via RAFT Polymerization.
- (4) Functionalization of polymers via “click” chemistry

March, 2002 – December, 2006: Post-doctoral Research Associate, University of Massachusetts Lowell, Massachusetts, USA

- (1) Working on a collaborative project between University of Massachusetts Lowell and Infineum USA LP., involves study on the cationic polymerization mechanisms of mixed C4 feeds, to determine rate constants of propagation and cross-propagation, expected to yield better reactor control and higher quality products (motor oil dispersants).
- (2) Worked on a National Science Foundation (NSF, USA) sponsored project and developed the “living”/controlled carbocationic polymerization of isobutylene, styrene, and styrene-based monomers in various solvent systems using various Lewis acids and initiating systems.

Detailed kinetics of “living”/controlled carbocationic polymerization for isobutylene, and styrene-based monomers was studied to determine equilibrium constant of ionization, rate constant of ionization and deactivation, apparent and absolute rate constant of propagation.

- (3) Studied the synthesis and physical chemistry aspects of capping reaction (functional telechelic polymers) in the carbocationic polymerization of isobutylene and styrene-based monomers.
- (4) Studied the effect of ligand of Lewis acid on the cationic polymerization of isobutylene using $\text{TiCl}_4/\text{TiBr}_4$ -mixed coinitiator (Project sponsored by Kaneka Corporation, Japan).
- (5) Studied synthesis and characterization of poly(styrene-*b*-isobutylene-*b*-styrene) triblock thermoplastic elastomers, which is employed as the polymer drug carrier for the TAXUSTM Express2TM Paclitaxel-Eluting Coronary Stent system (For Boston Scientific Corp., USA).
- (6) Studied kinetic and mechanistic studies of the carbocationic precipitation polymerization of isobutylene in polar solvents (Project sponsored by Exxon-Mobil Chemical Co., USA).

August 1997 - March, 2002: PhD in Polymer Chemistry, Indian Institute of Science, Bangalore, India

- (1) Studied physico-chemical properties of new polyperoxide and copolyperoxide polymers, detailed kinetics of free-radical induced oxidative polymerization and co-polymerization, characterization by various spectroscopic and thermal methods, and reactivity ratios studied by different methods.
- (2) Studied flexibility and chain dynamics of polyperoxide polymers by ^{13}C -NMR spin-lattice relaxation measurements, and glass transition temperature measurements.
- (3) Studied thermal degradation of polyperoxides, copolyperoxides and blends of polystyrene/poly (styrene peroxides) both in solution and solid state.

September 1996 to June 1997: MSc Research, Jadavpur University, Kolkata, India

Studied "Solvent and Electrode Kinetic Effects on the Cathodic Reduction of $3\text{I}_2 + 2\text{e}^- \rightarrow 2\text{I}_3^-$ in Some Pure and Mixed Dipolar Aprotic Solvents " for Master's degree thesis.

Awards:

- Visiting scientist at Université Pierre et Marie Curie, Paris, France, 2002
- Recipient of the Vasudevamurthy-Sundararajan Prize for the best performance in the course work during Ph.D. program awarded by the Indian Institute of Science, 1999, India
- Recipient of the National Merit Scholarship (1990-1995), Government of India for pursuing Higher Secondary and undergraduate (B. Sc) program in Chemistry

Technical Skills:

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| • Glove box (for cationic polymerizations under nitrogen atmosphere) | • Mass spectroscopy: Electron Impact, Chemical Impact and Pyrolysis-GC and MALDI-TOF MS |
| • High vacuum technique for anionic polymerization | • Thermal: DSC, TGA, DTA |
| • Gel permeation chromatography (GPC); Viscotek and MiniDawn | • Scanning Electron Microscopy (SEM) |
| • NMR: ^1H , ^{13}C (relaxation experiments) | • Transmission Electron Microscopy (TEM) |
| • UV-Visible, FT-IR, FT-Raman | • Parr reactor (high pressure reactor) |
| • Fiber optic UV-Vis instrument for <i>on-line</i> UV-Vis spectroscopic kinetic study | • Viscometer |
| | • Particle size analyzer |

Computer Skills:

- Use of Molecular Modeling packages BIOSYM and DISCOVER, have built polymers and studied their single chain dynamics. Use of AMPAC/MOPAC for semiempirical calculations

Personal: Male; Married; Nationality: Indian; *Date of Birth:* 10 July 1974

References

1. Professor Brent S. Sumerlin Department of Chemistry, Southern Methodist University, PO Box 750314, Dallas, TX 75275. Tel: (214) 768-8802 : Fax: (214) 768-4089 Email: bsumerlin@smu.edu	2. Professor Rudolf Faust Department of Chemistry, University of Massachusetts Lowell, Lowell, MA 01854, USA. Tel: 978-934-3675, E-mail: Rudolf_Faust@uml.edu
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Publications and Presentation:

- 36 Carbocationic polymerization of isobutylene using methylaluminum bromide coinitiators: synthesis of bromoallyl functional polyisobutylene. De, P.; Faust, R. **Macromolecules**, **2006**, 39(22), 7527-7533.
- 35 Relative reactivity of C4 olefins toward the polyisobutylene cation. De, P.; Faust, R. **Macromolecules**, **2006**, 39(20), 6861-6870.
- 34 Synthesis of halogen-free polyisobutylene by in situ hydride transfer to living polyisobutylene from tributylsilane. De, P.; Faust, R. **Polymer Bulletin**, **2006**, 56(1), 27-35.
- 33 Determination of the absolute rate constants of propagation for ion pairs and free ions in the living cationic polymerization of isobutylene. De, P.; Faust, R. **Macromolecules**, **2005**, 38(26), 9897-9900.
- 32 Determination of the absolute rate constant of propagation for ion pairs in the cationic polymerization of *p*-methylstyrene. De, P.; Faust, R. **Macromolecules**, **2005**, 38(13), 5498-5505.
- 31 Comparative study of the chain dynamics of polymers containing peroxy linkages in the backbone. De, P. **Polymer Preprints** (American Chemical Society, Division of Polym. Chem.) **2005**, 46(2), 852-853.
- 30 Capping reactions in cationic polymerization; Kinetic and synthetic utility. De, P.; Faust, R. **Polymer Preprints** (American Chemical Society, Division of Polym. Chem.) **2005**, 46(2), 847-848.
- 29 Living cationic polymerization of *p*-methylstyrene using SnCl₄ in dichloromethane and determination of absolute rate constant of propagation. De, P.; Faust, R. **Polymer Preprints** **2005**, 46(2), 935-936.
- 28 Effect of temperature and determination of the propagation rate constant in the carbocationic polymerization of 2,4,6-trimethylstyrene. De, P.; Sipos, L.; Faust, R.; Moreau, M.; Charleux, B.; Vairon, J –P. **Macromolecules**, **2005**, 38(1), 41-46.
- 27 Determination of the absolute rate constants of propagation for ion pairs in the carbocationic polymerization of *p*-chlorostyrene. De, P.; Faust, R. **Macromolecules** **2004**, 37(24), 9290-9294.
- 26 Living carbocationic polymerization of *p*-methoxystyrene by the *p*-methoxystyrene hydrochloride/SnBr₄ initiating system: determination of the absolute rate constant of propagation. De, P.; Faust, R. **Macromolecules** **2004**, 37(21), 7930-7937.
- 25 Living carbocationic polymerization of *p*-methoxystyrene using *p*-methoxystyrene hydrochloride/SnBr₄ initiating system. De, P.; Faust, R. **Polymer Preprint**, **2004**, 45(2), 736-737.
- 24 Determination of the propagation rate constant in the cationic polymerization of *p*-chlorostyrene. De, P.; Faust, R. **Polymer Preprints** (ACS, Division of Polym. Chem.) **2004**, 45(2), 734-735.
- 23 Cationic polymerization kinetics of styrene and styrene derivatives. De, P.; Faust, R. Manuscript published in **MACRO 2004** - 40th IUPAC World Polymer Congress.
- 22 Determination of rate constants in the carbocationic polymerization of styrene: effect of temperature, solvent polarity and Lewis acid. De, P.; Faust, R.; Schimmel, H.; Ofial, A. R.; Mayr, H. **Macromolecules** **2004**, 37(12), 4422-4433.
- 21 Simple synthesis of a weak nucleophilic base (4-ethyl-2,6-diisopropyl-3,5-dimethylpyridine) evidencing a double Janus Group effect. Balaban, A. T.; Ghiviriga, I.; Czerwinski, E. W.; De, P.; Faust, R. **J. Org. Chem.** **2004**, 69(2), 536-542.
- 20 Thermal degradation kinetics of vinyl polyperoxide copolymers. Sivalingam, G.; De, P.; Karthik, R.; Giridhar, M.; **Polym. Degrad. Stab.** **2004**, 84(1), 173-179.
- 19 On line visible spectroscopic study on the capping reaction of styrene cations with ditolyethylene. De, P.; Munavalli, M. V.; Faust, R. **Polymer Preprint**, **2003**, 44(2), 920-921.
- 18 Determination of the propagation rate constant in the carbocationic polymerization of 2,4,6-trimethylstyrene. De, P.; Faust, R.; Schimmel, H.; Mayr, H.; Moreau, M.; Charleux, B.; Vairon, J –P. **Polymer Preprint**, (American Chemical Society, Division of Polym. Chem.), **2003**, 44(2), 804-805.
- 17 Determination of the propagation rate constant in the carbocationic polymerization of styrene. De, P.; Munavalli, M. V.; Faust, R. **Polymer Preprint**, **2003**, 44(1), 1071-1072.
- 16 Effect of temperature, solvent polarity, and nature of Lewis acid on the rate constants in the carbocationic polymerization of isobutylene. Sipos, L.; De, P.; Faust, R. **Macromolecules** **2003**, 36,

- 8282-8290.
- 15 Synthesis, spectral characterization and thermochemical studies on poly(phenyl methacrylate peroxide). De, P.; Sathyanarayana, D. N.; Sadasivamurthy, P.; Sridhar, S. *J. Appl. Polym. Sci.*, **2003**, 88(9), 2364-2368.
 - 14 Synthesis and characterization of copolyperoxides of indene with styrene, α -methylstyrene and α -phenylstyrene. De, P.; Sathyanarayana, D. N. *J. Polym. Sci. Part B: Polym. Phys.* **2002**, 40, 2004-2017.
 - 13 High-pressure kinetics of oxidative copolymerization of styrene with α -methylstyrene. De, P.; Sathyanarayana, D. N. *Macromol. Chem. Phys.*, **2002**, 203(15), 2218-2224.
 - 12 Free-radical oxidative copolymerization of indene with vinyl acetate and isopropenyl acetate: synthesis and characterization. De, P.; Sathyanarayana, D. N. *J. Appl. Polym. Sci.*, **2002**, 86(3), 639-646.
 - 11 Thermal degradation kinetics of *para*-substituted poly(styrene peroxide)s in solution. De, P.; Chattopadhyay, S.; Giridhar, M.; Sathyanarayana, D. N. *J. Appl. Polym. Sci.* **2002**, 86(4), 957-961.
 - 10 Kinetics of thermal degradation of vinyl polyperoxides in solution. De, P.; Chattopadhyay, S.; Giridhar, M.; Sathyanarayana, D. N. *Polym. Degrad. Stab.* **2002**, 76(1), 161-170.
 - 9 Thermal degradation studies of *para*-substituted poly(styrene peroxide)s. De, P.; Chattopadhyay, S.; Giridhar, M.; Sathyanarayana, D. N. *Polym. Degrad. Stab.* **2002**, 76(3), 511-514.
 - 8 Reactivity ratios for the oxidative copolymerizations of indene with methyl methacrylate and methacrylonitrile. De, P.; Sathyanarayana, D. N.; Sridhar, S. *Eur. Polym. J.*, **2002**, 38(5), 847-855.
 - 7 Reactivity ratios for the terpolymerization of methyl methacrylate, vinyl acetate and molecular oxygen. De, P.; Sathyanarayana, D. N. *J. Polym. Sci. Part A: Polym. Chem.*, **2002**, 40(4), 564-572.
 - 6 Determination of the reactivity ratios for the oxidative copolymerizations of indene with methyl, ethyl and butyl acrylates. De, P.; Sathyanarayana, D. N. *Macromol. Chem. Phys.*, **2002**, 203(3), 573-579.
 - 5 Oxidative copolymerization of indene with *p*-tert-butylstyrene: synthesis, characterization, thermal analysis and reactivity ratios. De, P.; Sathyanarayana, D. N. *J. Polym. Sci. Part A: Polym. Chem.*, **2002**, 40(1), 9-18.
 - 4 *Para*-substituted poly(styrene peroxide)s: synthesis, characterization, thermal reactivities and chain dynamics studies in solution. De, P.; Sathyanarayana, D. N. *Macromol. Chem. Phys.*, **2002**, 203(2), 420-426.
 - 3 Synthesis of poly(1,3-diisopropenylbenzene peroxide). De, P.; Sathyanarayana, D. N. *Indian J. Chem.*, **2001**, 40A(9), 1009-1011.
 - 2 Polymerization of vinyl acetate with styrene and α -methylstyrene under high oxygen pressure. De, P.; Sathyanarayana, D. N. *Indian J. Chem.*, **2001**, 40A(12), 1282-1287.
 - 1 Synthesis, structural characterization, thermal studies and chain dynamics of poly(methacrylonitrile peroxide) by NMR spectroscopy. De, P.; Sathyanarayana, D. N.; Sadasivamurthy, P.; Sridhar, S. *Polymer*, **2001**, 42(21), 8587-8593.

Patents/Patent Disclosure Applications:

1. Faust, R.; De, P. Capping reactions in cationic polymerization; kinetic and synthetic utility. US Patent Application 60/674,649, April 25, 2005.

Review Papers and Book Chapters:

1. De, P.; Faust, R. *Living Cationic Polymerization of Vinyl monomers*. Matyjaszewski, K (ed.), VCH-Wiley, Volume II, **in Press**.

International Meeting/Seminar:

1. ACS National Meeting in Washington, DC, Aug 28-Sept. 1, 2005 and presented three posters.
2. ACS National Meeting in Philadelphia, PA, August 22-26, 2004 and presented two posters.
3. IUPAC International Symposium on Ionic Polymerization June 30-July 4, held at Boston, Massachusetts, USA, 2003 and presented a poster.
4. ACS National Meeting in New York, NY, September 7-11, 2003 and presented two posters.
5. ACS National Meeting in New Orleans, Louisiana, USA, 23-27 March 2003 and gave a lecture.
6. ACS National Meeting held in Boston, USA, 18-22 August 2002.
7. Two weeks intensive training on carbocationic polymerization at the Laboratoire de Chimie Macromoléculaire, Université Pierre et Marie Curie, T44 E1, 4 Place Jussieu, 75252 Paris, Cedex 05, France (2002).