
Anuj Mittal

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Objective

Seeking a challenging and rewarding position in multidisciplinary applied research/development in Polymer Chemistry and Material Science & Engineering

Present Occupation

Working as a postdoctoral fellow with *Prof. Axel H. E. Müller* at Macromolecular Chemie II, Bayreuth, Germany.

Experience & Skills

- † Proficient in carrying out reactions under inert atmosphere and vacuum using Schlenk-line techniques and handling of the air-sensitive compounds.
- † Experienced in multi-step purification (& handling) of reagents and solvents necessary for performing a controlled/ "living" polymerization reactions.
- † Experience in, controlled radical, free radical, and anionic polymerization. Presently engaged in coordination polymerization of acrylates.
- † Experience in performing kinetic studies of slow polymerization reactions, e.g. atom transfer radical polymerization of acrylates and styrene in low polarity solvents, by syringing out technique under high N₂ pressure.
- † Operational knowledge of GPC-(coupled with UV and RI detector), GC, VPO, LS-MALLS, FT-IR, NMR-200, CV and UV instruments.
- † Good skills at interpretation of spectral data
- † Computer skills – Ansi C and programming, Chem-window, ISIS, MS-Office applications (Excel, Power Point etc.) and in customized packages like, Origin, Reference Manager, End note etc, and Operating systems (Windows, Unix). In addition, literature search tools like SciFinder, J-gate, Scopus, Science direct and STN.

Education

- † **Ph.D. course work** (CGPA (17 credits) - 6.6 / 8.0)
(May 1999)
Advisor: Prof. K. Kishore
Indian Institute of Science (IISc), Bangalore, Dept. of Inorganic & Physical Chemistry (IPC), Bangalore-560012, India

- † **Ph.D.** (Chemistry), June, 2006
National Chemical Laboratory, C.S.I.R., Govt. of India, Pune, India.

Thesis Advisor: **Dr. S. Sivaram**, Director, NCL.
Thesis Title: **"Controlled Synthesis of Acrylic Polymers"**
Degree to be awarded by the University of Pune, 2006

- † **Master of Science** (Organic Chemistry), **First class** (July, 1998)
Indian Institute of Technology, Roorkee (formerly, University of Roorkee)
Uttaranchal, India

Salient Features of Doctoral Study

- † The study involves a detailed investigation of a new tridentate N-donor ligand, *2,6-bis* [1-(2,6-diisopropylphenylimino) ethyl] pyridine (BPIEP), comprising batch, kinetics, solvent, temperature, aging and substituents effects differing in electronic and steric property, on the course of ATRP. In addition, a new N-donor ligand, *2,6-bis*(4,4-dimethyl-2-oxazolin-2-yl) pyridine (*dmPYBOX*) was synthesized. When it was complexed with Cu(I)Br, the ligand caused controlled polymerization of MMA.

- † The other part of the study involves the use of new initiators such as 3-bromo-3-methylbutanone-2 (MBB), 3-(bromomethyl)-4-methylfuran-2,5-dione (BMFD) and 2-bromo propionitrile (BPN) resulted in controlled radical polymerization of MMA at 90 °C in toluene as solvent and BPIEP/CuBr as the catalyst system. A simple cyclic anhydride (BMFD) proved to be an efficient initiator for ATRP of MMA. The mechanism of initiation with BMFD was elucidated.

- † In the course of investigation, ATRP of a vinyl ketone monomer, namely, methyl vinyl ketone (MVK) was also examined using an initiator that has structural similarity to the propagating radical. Polymerization of MVK was studied by ATRP as well as reverse ATRP. Surprisingly, there was no polymerization in both the processes. A detailed investigation for non-polymerizing nature of MVK was undertaken. Results established that a strong association exists between the monomer and the catalyst resulting in the deactivation of the catalytic cycle

Publications

- † "A novel tridentate N-donor as ligand for copper catalyzed ATRP of MMA" **A.Mittal** and S. Sivaram. (*J. Polym. Sci. Polym. Chem.*, 2005: 43, 4996).
- † "Unfavorable Coordination of Copper with Methyl Vinyl Ketone in Atom Transfer Radical Polymerization". **A. Mittal**, D. Baskaran and S. Sivaram". (*Macromolecules*, 39, 5555, 2006).
- † "Copper Catalyzed ATRP of Methylmethacrylate Using Aliphatic Bromo Ketone Initiator" **A. Mittal**, D. Baskaran and S. Sivaram. (*Macromolecular Symposia*, 240, 238, 2006).
- † "Intramolecular ring closure followed by initiation of controlled radical polymerization: 3-(bromomethyl)-4-methylfuran-2,5-dione as a novel ATRP initiator", *Macromolecules*, **A. Mittal** and S. Sivaram (*Under Preparation*).
- † Novel initiators for ATRP of methyl methacrylate: 3-bromo-3-methylbutanone-2 and 2-bromopropionitrile", *Macromol. Sci. Chem. Phys.*, **A. Mittal** and S. Sivaram (*Under Preparation*).

Posters and Presentations

- † "*Studies in Atom Transfer Radical Polymerization Using a Tridentate N-Donor Ligand: New Monomers and Initiators* " **A. Mittal**, D. Baskaran and S. Sivaram, poster presented in "IP 2005" an international symposium on Ionic Polymerization (Under the auspices of International Union of Pure and Applied Chemistry-IUPAC), October 2005, held at Goa, India.
- † "*A novel tridentate nitrogen donor as ligand in copper catalyzed ATRP of methylmethacrylate: Influence of ligand concentration* " **A. Mittal** and S. Sivaram, poster presented in "Macro 2004" an international conference on polymers for advanced technologies, December 2004, held at RRL Thiruvananthapuram, Kerala, India. Dec. 15-17, 2004 (2004), PA.50/1-PA.50/5, CAN 144: 70135
- † "*Atom transfer radical polymerization: An approach to controlled radical polymerization*". **A. Mittal** and S. Sivaram, oral presentation in "Macro 2002" an international seminar on frontiers of polymer science and engineering, December, 2002 held at I.I.T Kharagpur, West Bengal, India.
- † "*Atom transfer radical polymerization: An approach to controlled radical polymerization*". **A. Mittal**, D. Baskaran and S. Sivaram, poster presentation at "NCL-TU/e, Eindhoven, Joint seminar at NCL, Pune, February, 2001.

Awards\ Fellowships\Certificates

- † Junior Research Fellowship (**JRF'98**) awarded by the Council of Scientific & Industrial Research (CSIR), New Delhi.
- † Secured All India Rank 64 in the Graduate Aptitude Test in Engineering (**GATE-98**) conducted by I.I.T's and IISc-Bangalore in 1998, scoring 95.87 percentile.
- † Certificate of National Mathematics Olympiad (**NMOC**) conducted by mathematics association of India, New Delhi.
- † Holding life-membership of *Society of Polymer Science (SPS)* of India, Pune chapter ([http:// www.spsindia.org/index.html](http://www.spsindia.org/index.html)), Pune.

Doctorate Seminars Delivered

- † Electronically Conducting Polymers: Precise Length and Control
- † Matrix Assisted Laser Desorption Ionization-Time of Flight (MALDI-TOF) Analysis of Polymers
- † Atom Transfer Radical Polymerization: An approach to controlled radical polymerization.

Personal Details

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References

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Prof. Axel H. E. Müller

Chairman

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