

Curriculum Vitae:

Dr. Gopal Shankar Mishra

Objective	<i>My career objective is to obtain a suitable research position that will provide me an opportunity in catalysis and/or polymerization field to utilize my knowledge.</i>
Address	Laboratory of Materials, Department of Chemistry, UTAD University, Vila Real, 5001801, Portugal
Contacts	Mobil No. : +351 960380888 e-mail: mishrags@gmail.com
Born	17 June 1968, India
Nationality	Indian (Residence card of Portugal)
Academics	Ph.D. - December, 1998 (Polymer Science) <i>“Polymerization in the presence of ylide containing 15th group elements”</i> Harcourt Butler Technological Institute (H.B.T.I.), Kanpur-208002, India Masters - 1989, 72 % Marks from Kanpur University, Kanpur, India Bachelor - 1987, 62 % Marks from Kanpur University, Kanpur, India
Publications	05 patents / 27 SIC publications / 18 conferences publications (<i>See publication list</i>)
Research	<ul style="list-style-type: none">• Heterogeneous Catalysis• Metals Complex Synthesis, Crystallization and Characterizations• Inorganic Supports Preparation (<i>e.g.</i> nano-porous magnetic silica, MCM-41, SBA-15)• Pressure reactions (<i>i.e.</i> oxidation, hydro-isomerization of alkanes)• Micro-batch reactor and loop type reactor• Polymer degradation of waste materials
At Current	1) <i>Project Investigator:</i> (form May, 2008 till to date) Nature of Work: Teaching and Research. EU Funded project form Foundation for Science & Technology (FCT), Portugal on the topic “ <i>Nano-pours hybrid catalysts for oxidation or reformation pressure reactions of alkanes</i> ”.
Past-Experience	2) <i>Postdoctoral:</i> (from 2004 to 2008) “ <i>Heterogeneous and homogeneous catalysts for hydrocarbons oxidation Reactions</i> ” funded by FCT, Portugal 3) <i>Postdoctoral:</i> (year 2004) “ <i>DMC catalyst for polymerization of cyclohexene oxide with CO₂</i> ” Korean Academy of Science and Technology, S. Korea. 4) <i>Project Investigator:</i> (2001-2004). I got a Project from Department Science & Technology (DST), India on “ <i>Development of supported metal complex catalysts for alkanes oxidation</i> ” 5) <i>Research Associate:</i> (1998-2001) from Council of Scientific and Industrial Research (CSIR), India. “ <i>V and Co metal supported complexes for hydrocarbons oxidation reactions</i> ” 6) <i>Consultant:</i> (2003-2004) VAM Organics, Gajrola, India, project on “ <i>Preparation of ion exchange resin polymer beads</i> ” worked at IIT, Kanpur, India. 7) <i>Asst. Production Manager</i> (1996 – 1998) at ICI Catalyst Limited, Kanpur, India
Language	Fluent: English – written and spoken; Native language: Hindi; Fair level Portuguese.

Instruments Handling Experience:

(i) Gas Chromatography (ii) GC-Mass (iii) FT-IR Spectroscopy (iv) NMR Spectroscopy (v) Thermogravimetric Analysis (vi) Differential Scanning Calorimetry (vii) Electron Paramagnetic Resonance (viii). Atomic Absorption Spectroscopy (ix) Single Crystal X-ray crystallography

Awards and Honors:

- (i) Research Associate fellowship (1998) Council of Scientific and Industrial Research, India)
- (ii) Young Scientist Award & fellowship (2001) DST, New Delhi, India
- (iii) Postdoctoral Project & fellowship (2004) FCT, Portugal
- (iv) Postdoctoral Project & fellowship (2007) FCT, Portugal
- (v) Auxiliary Professor by International competition (2008) UTAD, Vila Real, Portugal

As Projects Investigator (PI):

- (i) Year 2010, received a European Union Funded project as PI from FCT, Portugal with two Masters Students
- (ii) Year 2001, received a project as PI form Department Science & Technology, India, run at IIT, Kanpur, India.

Research Collaboration:

- (i) Prof. Shinzo Suzuki, Department of Physics, Kyoto University, Kyoto, Japan,
- (ii) Prof. Georgiy B. Shul'pin, Russian Academy of Sciences, Moscow, Russia
- (iii) Prof. Suman Mukhopadhyay, Department of Chemistry, IIT, Indore, India
Prof. Shishir Sinha, Chemical Engineering Department, IIT, Roorkee, India
- (iv) Prof. Cristina Freire, REQUIMTE, Faculdade de Ciências, Universidade do Porto, Portugal

Journal Reviewers: 1) Applied Catalyst, 2) Applied Polymers Science, 3) Catalyst letters, 4) Review chemical Engineering, Industrial Engineering and Chemistry research etc.

In year 2011, I was appreciated and received a certificate by the American Chemical Society for paper review.

Books/Monographs: “*Chemical Process Safety*” (published by Prentice Hall publication) as co-author ship with Prof. S. Sinha, Chemical Engineering, IIT, Roorkee, India under writing.

Short Term/Refresher Course attended: “*Modern Techniques for Polymer Characterization*” at Defence Materials & Stores Research & Development, Establishment (DMSRDE) Kanpur, India (for 3 months, 2001).

Computer Skill:

- System : Windows- 7 and XP, Linux., MS-DOS
- Package : Chem. draw, Mercuri, Origin, MS Office, Access, Outlook, Power Point, Excel and Sigma etc.

Membership of Professional Bodies:

- (i) Member of American Chemical Society (No. 2410201)
- (ii) Member of Chemical Engineers Congress, India
- (iii) Member of Catalyst Society of Portugal
- (iv) Member of Indian Chemical Engineers Congress

Referees:

- 1. Prof. P.B. Tavares, Director, Chemistry Center,
University of Trás-os-Montes and Alto Douro, Vila Real,
5001801, Portugal *e-mail : ptavares@utad.pt*
- 2. Prof. A.J.L. Pombeiro, Centro de Química Estrutural,
Instituto Superior Técnico, Lisbon 1049001, Portugal *e-mail : pombeiro@ist.utl.pt*
- 3. Prof. Anil Kumar, Department of Chemical Engineering,
Indian Institute of Technology, Kanpur-208016, India *e-mail : anilk@iitk.ac.in*
- 4. Prof. G.B. Shul'pin, Semenov Institute of Chemical Physics,
Moscow, Russia *e-mail : gbsh@mail.ru*

I hereby declare that the entries in this form are true to the best of my knowledge.

Place : Vila Real,, Portugal

Date :

Gopal S. Mishra

Publication List : Patents / SCI Publications / Conferences

Patents List: (* corresponding Author)

1. WO Patent PCT/IB2009/055665 (2011) **Gopal S. Mishra***, Anil Kumar, Pedro B. Tavares,. “Vanadium hybrid catalysts and use thereof in cycloalkane selective oxidation processes.”
2. PT 104862 (2010) : **Gopal S. Mishra***, Anil Kumar, Pedro B. Tavares, “New hybrid vanadium catalysts and there uses for selective oxidation of cyclohexane to cyclohexanol and cyclohexanone.”
3. PT 104713 (2009): Armando J.L. Pombeiro, Luísa M.D.R.S. Martins, M. Fátima C. Guedes da Silva, **Gopal S. Mishra**, Telma F.S. Silva, Riccardo Wanke, Cu complex of scorpionate ligands as catalysts for the application of oxidation (H₂O₂) of cyclohexane under mild conditions.
4. PT 104447 (2009): Armando J.L. Pombeiro, Luísa M.D.R.S. Martins, Telma F.S. Silva, **Gopal S. Mishra**, Chloro vanadium (III and IV) complexes catalyzed partial oxidation of cyclohexane under solvent free conditions.
5. PT 104197 (2008): Armando J.L. Pombeiro, **Gopal S. Mishra**, Luísa M.D.R.S. Martins, Elisabete C.B.A. Alegria, João J.R. Fraústo da Silva, Re complexes supported on functionalized silica for catalysis of n-hexane and cyclohexane with dioxygen under mild conditions.

Publications List: (* corresponding Author)

1. **Gopal S. Mishra***, Anil Kumar and Pedro B. Tavares, **Advance Synthesis and Catalysis (Accepted under revision) 2012**. Novel tris(1-pyrazolyl)ethanol Au complexes, X-ray crystal structural and application as immobilized catalyst on nano-size mesoporous magnetic silica for C-H bond activation of alkanes with dioxygen.
2. **Gopal S. Mishra***, Anil Kumar, **Applied Catalysis A: General, (accepted) 2012**, Hydro-reformation of saturated hydrocarbons with novel MCM-41 immobilized Re(V) complex catalysts.
3. **Gopal S. Mishra***, Anil Kumar and Pedro B. Tavares, **Journal of Molecular Catalysis A: Chemical (in press, doi:10.1016/j.molcata.2012.01.03) 2012**, Single site anchored novel Cu(II) catalysts for selective liquid-gas phase O₂ oxidation of n-alkanes.
4. Telma F.S. Silva, **Gopal S. Mishra**, M. Fátima Guedes da Silva, Luísa M.D.R.S. Martins and Armando J.L. Pombeiro, **Journal of Organometallic Chemistry, 696 (2011) 1310-1318**. Synthesis and structural characterization of iron complexes with 2,2,2-tris(1-pyrazolyl)ethanol ligands: application in the peroxidative oxidation of cyclohexane under mild conditions.
5. **Gopal S. Mishra***, Anil Kumar, **Chemical Engineering and Science, 1 (2011) 1224-1231**. Immobilized Pd complexes over MCM-41 as catalysts for effective reformation of hydrocarbons.
6. **Gopal S. Mishra***, Anil Kumar, **Reaction Kinetics Mechanism and Catalysis, 102, (2011) 165 - 181**, Selective functionalization of n-hexane with molecular O₂ catalyzed by immobilized Cu/Co, Cu/Fe and Co/V complexes over modified Al₂O₃.
7. **Gopal S. Mishra***, Anil Kumar, Suman Mukhopadhyay and Pedro B. Tavares, **Applied Catalysis A: General, 384 (2010) 136-146**. Novel alkoxy silane pentadentate schiff-base V-complexes: synthesis and application, as hybrid inorganic-organic catalysts for selective oxidation of cyclohexane with O₂.
8. **Gopal S. Mishra**, Telma F. S. Silva, M. Fátima Guedes da Silva, Riccardo Wanke, Luísa M. D. R. S. Martins and Armando J. L. Pombeiro, **Dalton Transactions (2009) 9207-9215**. Cu^{II} complexes bearing the 2,2,2-tris(1-pyrazolyl)ethanol or 2,2,2-tris(1-pyrazolyl)ethyl methanesulfonate scorpionates. X-ray structural characterization and application in the mild catalytic peroxidative oxidation of cyclohexane
9. **Gopal S. Mishra**, Telma F.S. Silva, Luisa M.D.R.S. Martins, Armando J. L. Pombeiro, **Pure Appl. Chem., 81,7 (2009) 1217-1227**. Scorpionate complexes of vanadium (III or IV) as catalyst precursors for solvent-free cyclohexane oxidation with dioxygen,
10. **G.S. Mishra**, E.C. B. Alegria, L.R. Martins, A.J.L. Pombeiro, **Applied Catalysis A: General 285 (2008) 92-100**. Rhenium complexes heterogenized on chemically modified silica as active catalysts for selective oxygenation of hydrocarbons (C₆ & C₇).

11. **Gopal S. Mishra***, *Shishir Sinha*, **Catalysis Letters**, **125** (2008)139 – 144, Oxidation of cyclohexane with molecular oxygen catalyzed by SiO₂ supported Palladium catalysts.
12. *Georgiy B. Shul'pin*, **Gopal S. Mishra**, *Lidia S. Shul'pina*, *Tatyana V. Strelkova*, *Armando J.L. Pombeiro*, **Catalyst Communication**, **8** (2007) 1516 - 1520. Oxidation of hydrocarbons with hydrogen peroxide catalyzed by maltolato vanadium complexes covalently bonded to silica gel.
13. **Gopal S. Mishra**, *João J.R. Fraústo da Silva*, *Armando J.L. Pombeiro*, **Journal of Molecular Catalysis A: Chemical**, **265** (2007) 59 - 69. Supported bis(maltolato)oxovanadium complexes as catalysts for cyclopentane and cyclooctane oxidations with dioxygen,
14. **Gopal S. Mishra**, *Armando J.L. Pombeiro*, **Applied Catalysis A: General**, **304** (2006) 185 - 194. Oxyfunctionalization of *n*-pentane and *n*-hexane by oxovanadium complexes supported on carbamated modified silica gel.
15. **Gopal S. Mishra**, *Armando J.L. Pombeiro*, **Journal of Molecular Catalysis A: Chemical**, **239**, (2005) 96 - 102. Selective single pot oxidation of cyclohexane by molecular oxygen in presence of bis(maltolato)oxovanadium complexes covalently bonded to carbamated modified silica gel.
16. *M. Jhansi Lakshmi*, **G.S. Mishra**, *A. Kumar*, **Indian Journal of Chemistry: Sec. B**, **44**, 2 (2005) 349 - 355. Preparation of carbamate modified alumina supported heterobinuclear macrocyclic cobalt/vanadium complex for *n*-octane oxidation reaction.
17. **G.S. Mishra**, *M. Jhansi Lakshmi*, *A. Kumar*, **Journal of Molecular Catalysis A: Chemical**, **230**, 1-2 (2005) 35-42. Synthesis of hetero binuclear macrocyclic Co-V complex chemically bound to modified alumina support using cyclohexane oxidation.
18. **G.S. Mishra**, *A. Kumar*, **Kinetics and Catalysis**, **45**, 3 (2004) 394-399, Selective oxidation of linear alkanes by schiff base ligand [1,2-bis(salicylideneamino) phenylene]vanadium complex bonded on modified silica gel support"
19. *M. Jhansi L. Kishore*, **G.S. Mishra**, *A. Kumar*, **Journal of Molecular Catalysis A: Chemical**, **216** (2004) 157- 163. Isomerization of *n*-hexane using homonuclear macrocyclic zirconium complex covalently bonded to carbamate modified alumina,
20. **Gopal S. Mishra**, *Amit Kumar*, *Anil Kumar*, **Indian Journal of Chemistry: Sec. B**, **43**, 7 (2004) 1487- 1492, [1,2-bis(salicylideneamino)phenylene]cobalt(II) complex supported on carbamate modified silica gel as a reformation catalyst for *n*-hexane.
21. **G.S. Mishra**, *Anisia K. S.* & *A. Kumar*, **Journal of Molecular Catalysis A: Chemical**, **215** (2004) 121- 128. Reforming of *n*-hexane in presence of [1,2-bis (salicylideneamino)phenylene] zirconium salen complex chemically bound on modified silica gel support catalyst,

22. **Gopal S. Mishra, Amit Kumar, Anil Kumar, Journal of Molecular Catalysis A: Chemical, 201, 1-2 (2003) 179 – 188.**Covalently bonded schiff base cobalt complex catalyst for the selective oxidation of linear alkanes using molecular oxygen".
23. **G. S. Mishra, A. Kumar, Journal of Molecular Catalysis A: Chemical, 192 (2003) 275 – 280,** Silica gel supported [1,2-bis(salicylideneamino)phenylene]oxovanadium complex catalyst for the oxidation of n-heptane using molecular oxygen.
24. **G.S. Mishra, A. Kumar, Reaction Kinetics and Catalysis Letters, 80,2 (2003) 223 – 231.** Liquid phase oxidation reaction of n-octane catalyzed by silica supported vanadium complex using molecular oxygen.
25. **Amit Kumar, Gopal S. Mishra, Anil Kumar, Transition Metal Chemistry, 28, 8 (2003) 913 - 917.**Catalytic oxidation of cyclohexane with molecular oxygen using schiff base chemically bonded cobalt(II) complex on modified silica gel support.
26. **G. S. Mishra, A. Kumar, Catalysis Letters, 81 (2002) 113-117.** Preparation of heterogeneous vanadium catalyst for selective hydroxylation of cyclohexane by molecular oxygen.
27. **G.S. Mishra, A. K. Srivastava, Asian Journal of Chemistry, 14 (2002) 319 -327.**Application of 1,2- dipolar compounds as a modifier for polyaddition of bisphenol- A.
28. **G.S. Mishra, A. K. Srivastava, Polymer International, 42 (1997) 281 - 288.** Effect of ICPY on properties of semi-IPN from poly (ZnA₂) and poly (Sty.-CO-MMA).

Publications in Conferences:

1. **Gopal S. Mishra***, Anil Kumar, and Pedro B. Tavares, **243rd ACS Meeting**, San Diego, California, March 25-29, 2012. (Division of Petroleum Chemistry, PAPER ID: 18255) "Oxyfunctionalization of hydrocarbon with novel synthesized and immobilized tris-pyrazoyl Cu complexes catalysts" (final paper number: *(Oral presentation)*).
2. **Gopal S. Mishra***, Anil Kumar, and Pedro B. Tavares, **EuropaCat-X**, (PO32) 28 Aug.-2 Sept., Glasgow, UK, Synthesis, X-ray structural characterization and immobilization of scorpionate Cu complex on SBA-15: application in the liquid-gas phase cycloalkane O₂ oxidation (*Oral presentation*).
3. **Gopal S. Mishra*** and Pedro B. Tavares **NCCC-XIth**, Netherlands' Catalysis and Chemistry International Conference, 1-3 March 2010 at Noordwijk, Netherlands. Synthesis of pentacoordinate trialkoxysilane Cu^{II} and Co^{II} complexes as supported catalysts for selective oxyfunctionalization of n-alkanes. (*poster presentation*).
4. **Gopal S. Mishra***, Anil Kumar and Pedro B. Tavares, **6-WCOC**, 6th World Congress of Oxidation Catalyst, 5-10 July, 2009 at Lille, France, Cobalt, copper and vanadium complexes covalently linked with silica as supported catalysts for oxidation of cyclohexane by dioxygen (*poster presentation*).

5. **Gopal S. Mishra***, Shishir Sinha, **NCCC-IXth**, *Netherlands' Catalysis and Chemistry International Conference*, 3-5 March 2008 at Noordwijkerhout, Netherlands, Oxyfunctionalization of alkanes by supported maltolato oxovanadium complexes catalysts (*oral presentation*).
6. **G.S. Mishra**, E.C. B. Alegria, L.R. Martins, A.J.L. Pombeiro, **8th-CAFC**, *8th International Symposium on Catalysis Applied to Fine Chemicals* 16 - 20 September 2007, Verbania, Italy, Effective oxyfunctionalization of n-hexane with molecular oxygen catalyzed by soluble and supported rhenium complexes (*oral presentation*).
7. **G.S. Mishra**, E.C. B. Alegria, L.R. Martins and A.J.L. Pombeiro, **8^o-ENCMP**, *8th Meeting of Division of catalysis and Porous Materials*, 21-23 Sept. 2007 at Lemago, Portugal, Mesoporous silica supported pyrazolyl rhenium catalysts for direct oxidation of n-heptane by dioxygen (*poster presentation*).
8. **G.S. Mishra**, E.C.B. Alegria and A.J.L. Pombeiro, **NCCC-VII**, *Netherlands' Catalysis and Chemistry International Conference*, 6-8 March 2006 at Noordwijkerhout, Netherlands, Supported pyrazol rhenium complexes as catalysts for cyclohexane oxidation by molecular oxygen (*oral presentation*).
9. **G.S. Mishra** and A.J.L. Pombeiro, **ISHHC-XII**, *International Symposium on Relations between Homogeneous and Heterogeneous Catalysis*, 18 -22 July 2005 at Florence, Italy, Carbamate modified silica gel supported bis(maltolato)oxovanadium(IV) complex for selective oxidation of cyclohexane by molecular oxygen (*poster presentation*).
10. **Gopal S. Mishra** and Armando J. L. Pombeiro, **VII-ENCONTRO**, *7th Meeting of Division of catalysis and Porous Materials*, 13 – 14 May 2005 at Instituto Superior Técnico, Lisbon , Portugal, Oxyfunctionalization of n-pentane by O₂ catalyzed by chemically modified silica gel supported V-complexes (*poster presentation*).
11. **G.S. Mishra** and A. Kumar, "**The 13th International Congress on Catalysis**", held on 11 - 16 July 2004 Paris, France, A hetero binuclear macrocyclic Co-V complex bound with carbamated modified alumina support used for cyclohexane oxidation. (*oral presentation*).
12. **G.S. Mishra**, Anisia K. S. and A. Kumar, CHM-332, **Chemical Engineering Congress-2003**, Dec. 19-22, (2003) at Regional Research Laboratory, Bhubaneswar, India, Reforming of n-alkane in presence of zirconium salen complex chemically bound on modified silica gel support catalyst. (*oral presentation*).
13. **G.S. Mishra** and A. Kumar, CHM-582, **Chemical Engineering Congress-2003**, Dec. 19-22, India (2003) at Regional Research Laboratory, Bhubaneswar, A heterogeneous binuclear macrocyclic transition metal complex catalyst for oxidation of alkanes using molecular oxygen (*oral presentation*).
14. **G. S. Mishra** and A.K. Srivastava, **International Conference on Plastic and Environment Opportunities and Challenges**" Feb. 24-25, (2003) at Sri Ram Institute of Industrial Research, New-Delhi, India, Radical copolymerization of vinyl monomers initiated by the imidazolium p-chlorophenacylide (ICPY) (*poster presentation*).

15. **G.S. Mishra & A. Kumar, Chemical Engineering Congress-2002**, Dec. 19-22 (2002) at Indian Institute of Chemical Sciences, Hyderabad, India, An optimal condition for liquid phase oxidation of n-pentane catalyzed by heterogeneous schiff base vanadium oxo complex (*oral presentation*).
16. **G.S. Mishra & A. Kumar, Chemical Engineering Congress-2001**, p.505-508 (2001) Chennai, India, Hydroxylation of cyclohexane by molecular oxygen with silica gel supported vanadium catalyst (*oral presentation*).
17. **G.S. Mishra and A. Kumar, CHEMCON-2000**, held at Dec. 19-22, REC 41-45 (2000) Science City, Calcutta, India, Catalytic oxidation of alkanes using molecular oxygen with supported vanadium complex (*oral presentation*).
18. **G.S. Mishra & A. K. Srivastava, Polymers Beyond AD 2000, 202-206 (1999)** held at Indian Institute of Technology, Delhi, India Synthesis & characterization of modified epoxy resin using ICPY (*poster presentation*).
19. **G.S. Mishra & A. K. Srivastava, Polymer Science Recent Advance, 1 , 45 - 50 (1994)** held at Indian Petrochemical Corporations Limited, Baroda, Gujarat, India, Polymerization of styrene and methylmethacrylate in the presence of nitrogen ylide (*oral presentation*).

Communicated Papers:

1. **Gopal S. Mishra**, Armando J. L. Pombeiro, **Catalysis Communications**. Tris-pyrazolyl vanadium complexes act as homogenous catalysts for C5 and C6 hydrocarbons oxyfunctionalization.
2. **Gopal S. Mishra***, Anil Kumar, Pedro B. Tavares, **Journal of Inorganic Chemistry**. Newly synthesized Cu(II)-containing pentadentate silane complexes anchored on Al₂O₃ or SiO₂ as highly efficient catalysts for *n*-alkanes oxidation with O₂,

Statement of Purpose:

I have carried out my Ph.D. degree on “Polymer Chemistry” under supervision of Lat. Prof. A. K. Srivastava, Chemistry Department, Harcourt Butler Technological Institute, Kanpur, India. After Ph.D., I joined Prof. Anil Kumar’s group as a postdoctoral under at Department of Chemical Engineering, Indian Institute of Technology, Kanpur, India in the project of “*Supported V, Co complexes for oxidation and reformation of alkanes*”. Based upon my research, I won the prestigious “*Young Scientist*” award (2001) and an independent research project as P.I. from Department Science and Technology, India. In year 2004, I have received PDF fellowship from FCT, Portugal based on my research proposal and worked with Prof. AJL Pombeiro, Centro de Quimica, Instituto Superior Técnico, Lisbon, Portugal. Year 2008, I have won the Auxiliary Professor Position at University of Tras os Montes and Alto Douro, Vila Real Portugal and recently revived a project as PI form EU-Funded FCT, Portugal.

Current research work requires the knowledge synthesis of new metal complexes, coordination chemistry and preparation new support materials *i.e.* nano-size mesoporous magnetic silica, raw nano size Co/Ni carbon tube, modified MCM-41, modified SBA-15. For heterogeneous catalysis propose, novel complexes (e.g. Au, Pd, Re, V) with tris-pyrazoyl ligands, pentacoordinate silane ligands and tripods ligands have synthesized and well characterized by single crystal X-ray analysis. These complexes have anchored by the covalent bond to above mesoporous supports as hybrid inorganic-organic catalyts.

The resultant catalyts have used for *selective oxidation by O₂ and hydro-reformation* of hydrocarbons (alkanes), under relatively mild reaction condition in batch type micro batch reactor. We found that these reactions becomes greatly specific with the formation of their industrially importance products with high catalytic TONs. For the best optimized condition, we have also analyzed various effecting factors of the reaction. In the *polymer degradation* reaction (HDPE, P-Sty), the best results were obtained by the SBA-15 supported Zr and Fe complexes under relatively mild condition and yield low molecular-weight products upon breaking C–C bonds of backbone polymer. These reactions fall within a current challenge to modern catalysis towards the development of catalyst recycle, use of cheap oxidant *i.e.* O₂ for selective product formation, in reformation to obtain high-octane selective product and recycle of non-biodegradable polymers. These reactions have industrial importance and environmental green chemistry significance.