

**Name**

Dr. Malobika Karanjai

**Qualification**

B.E, Mechanical (NIT Raipur), PhD (IIT Bombay)

**Designation**

Scientist-E

**Experience**

4 years of experience in particulate-chemical treatment of effluents of steel plants and 18 years in the area of powder production, compaction, consolidation, thermal treatment and composites. Major part of experience lies in Fe-based powder production through hydrogen and carbothermic reduction routes for various applications like PM grade, pyrolytic grade, electrode grade, MIM additives, fine powder grades through attrition route, magnetic grade. Powder consolidation using cold and hot compaction, sintering of powders or compacts in vacuum, hydrogen or inert, hot pressing, and synthesis of nano powders. Also worked in the area of composite design and development for Ti-based load-bearing orthopaedic applications, cerametallic friction materials and soft magnetic composites.

**Research Areas of Interest**

Powder production of micron to nano sized through reduction, hydride-dehydride method, comminution and chemical routes, compaction-cold and hot, sintering –pressure and pressureless, composites-design and process & product development for application engineering.

**List of Journal Publications:**

1. D.N. Fedorov, B.I. Bondarenko, Y.P. Pokotylo, O.M. Sviatenko, A. Sivakumar and M. Karanjai, Investigation of the influence of annealing parameters on iron powders produced from Indian ore concentrate”, 1999, Eco–Technologies and Energy Savings, Journal of Scientific studies, vol 5, 20-27. (Ekotechnologii IRresursosberezhenil)
2. Bondarenko B.I, Fedorov D.N, A.I. Khovavko, M. Karanjai, R. Sundaresan and A. Sivakumar, Study of soft magnetic iron powder production, Workshop on production and applications of soft magnetic materials for electric motors,

European Powder Metallurgy Congress in Munich Trade Fair Centre, Germany, October 18-20, 2000, 103-109.

3. Fedorov D.N, M. Karanjai, A. Sviatenko, A. Sivakumar, Study of the obtaining process of produce low carbon reduced iron powder from hematite by method of frozen furnace, *Poroshkovaya Metallurgia*, vol 3/4, March-April, 2002, 115-122.
4. Fedorov D.N, M. Karanjai, A. Sviatenko, A. Sivakumar, Study of the obtaining process of produce low carbon reduced iron powder from hematite by method of frozen furnace, *Powder metallurgy and metal ceramics*, vol. 4/4, 212-218, 2002.
5. M. Karanjai, D.N. Fedorov and A. Sivakumar, Iron based alloy powder Fe-P for soft magnetic application by a thermo-chemical process, *Transactions of Powder Metallurgy Association of India*, vol 28, 2002, 22-30.
6. A.I. Khovavko, D.N. Fedorov and K. Malobika, Thermodynamic evaluation of reduction of silica in the presence of iron, *Transactions of powder metallurgy association of India*, vol 28, 2002, 64-70.
7. A.I. Khovavko, K. Malobika, A.M. Sviatenko and D.N. Fedorov, Study of reduction kinetics of blue dust", *Powder Metallurgy in Automotive applications-II*, Chapter 2, Eds. T.R. Rama Mohan & P. Ramakrishnan, Oxford and IBH Publications Co. Pvt. Ltd., 2002, pp 95-104.
8. D.N. Fedorov, M. Karanjai and A. Sivakumar, Development of technologies to produce iron based powder from Indian Blue Dust, *Euro PM 2004 (Conference proceedings) Powder manufacturing and processes*, 2004, 105-110 Editors Dr. Herbert Danninger and Dr. Raimund Razi.
9. D.N. Fedorov, M. Karanjai, R. Sundaresan and A. Sivakumar, Selection of alloying method to produce iron based powder, *Powder Metallurgy and metal ceramics*, 44(5/6), May-June, 211-215, 2005.
10. D.N. Fedorov, M. Karanjai, R. Sundaresan and A. Sivakumar, Selection of alloying method to produce iron based powder, *Poroshkovaya Metallurgia*, vol 5/6, p. 8-13, 2005.
11. M. Karanjai, R. Sundaresan, G. V.N. Rao, T.R. Rama Mohan, B.P. Kashyap, Development of titanium based biocomposite by powder metallurgy processing with *in situ* forming of Ca-P phases, *Mat. Sc. Engg. A*, 2007, 447 (1-2), 19-26.
12. M. Karanjai, B.V. Manoj Kumar, R. Sundaresan, B. Basu, T.R. Rama Mohan and B.P. Kashyap, Fretting wear study on Ti-Ca-P biocomposite in dry and simulated body fluid, *Mat. Sc and Engg A*, 2008, 475 (1-2), 299-307.
13. M. Karanjai, R. Sundaresan, T.R. Rama Mohan and B.P. Kashyap, Evaluation of growth of calcium phosphate ceramics on Ti-Ca-P biocomposites, *Mat. Sc. Engg. C*, 2008, 28, 1401-1407.

14. M. Karanjai, A. Jyothirmayee, R. Sundaresan, T.R. Rama Mohan and B.P. Kashyap, Corrosion behaviour of PM processed Ti-Ca-P composites in Hank's Balanced Salt Solution using potentiodynamic studies, International Journal of Applied Ceramic Technology, 7[2], 148-155, 2010.

**Delivered talks in seminars:**

1. K. Malobika\*, A. Sivakumar, D.N. Fedorov, A. Sviatenko, Optimization of chemistry of sponge iron powder, presented at POWMAT'99, Hyderabad.
2. K. Malobika\*, Reduction-de carburising annealing and its application to iron systems, ARCI, 1999.
3. K. Malobika\*, S.B. Chandrasekhar, A. Sivakumar, Sintering studies on iron powders produced from haematite and magnetite, presented at PMAI 2000, Chennai.
4. Bondarenko B.I, Fedorov D.N, A.I. Khovavko, M. Karanjai\*, R. Sundaresan and A. Sivakumar, Comparative study of iron powders produced through different routes for soft magnetic applications, Workshop on production and applications of soft magnetic materials for electric motors, European Powder Metallurgy Congress, Munich Trade Fair Centre, Germany, October 18-20, 2000.
5. M. Karanjai\*, D.N. Fedorov and A. Sivakumar, Iron based alloy powder Fe-P for soft magnetic application by a thermo-chemical process, PM 02, India Habitat Centre, New Delhi, 2002.
6. A.I. Khovavko, D.N. Fedorov and K. Malobika\*, Thermodynamic evaluation of reduction of silica in the presence of iron, PM 02, India Habitat Centre, New Delhi, 2002.
7. A.I. Khovavko, K. Malobika\*, A.M. Sviatenko and D.N. Fedorov, Study of reduction kinetics of blue dust", Powder Metallurgy in Automotive applications-II, 2002
8. M. Karanjai\*, R. Sundaresan, T.R. Rama Mohan and B.P. Kashyap, Titanium-calcium-phosphatic Biocomposites through powder metallurgy, PMAI 03, Kolkata, 22nd -23rd Jan, 2004.
9. M. Karanjai\*, R. Sundaresan, T.R. Rama Mohan and B.P. Kashyap, Titanium-calcium-phosphatic Biocomposites through PM Processing-a Study, Indo-Australian Conference on Biomaterials, Implantable devices and Tissues Engineering, BITE 05, SCTIMST, Trivandrum, India, 19th-21<sup>st</sup> Jan. 2005.
10. Malobika Karanjai\*, Ranganathan Sundaresan, Tallapragada Raja Rama Mohan, Bhagwati Prasad Kashyap, Processing and properties of *in situ* Ti- Ca-P biocomposite by PM processing for load bearing applications, International

conference on Design of Biomaterials (BIND 06), 8-11th December, 2006, IIT Kanpur, India (**Invited talk**)

11. M. Karanjai, A. Jyothirmayee, R. Sundaresan, T.R. Rama Mohan and B.P. Kashyap, EIS studies of PM processed Ti-Ca-P biocomposites in Hanks balanced salt solution, PM-07, International conference with exhibition, Emerging Solutions through Powder Metallurgy for Automotive and Engineering Industry, PMAI, New Delhi, Feb 9-11, 2007, N. Delhi, India.
12. Malobika Karanjai\*, Deepak K. Pattanayak, B. P. Kashyap, B. T. Rao, R. Sundaresan, T. R. Rama Mohan, Studies in synthesis of particulate bioceramic composite materials, Indo-US workshop on composite biomaterials and implants, Indian Institute of Technology, 11-13th Dec 2007, Chennai, India. (**Invited talk**)
13. M. Karanjai\*, D. Chakrabarty and V. Mahender, Production of nano-crystalline titania using chemical vapour synthesis process, PM 08, International Conference and exhibition, Cost Effective Technologies for net shape production, Chennai Trade Centre, Chennai, India, 20-21st Feb 2008.
14. M. Karanjai\*, Y. Krishnapriya, D. Sen, A. Shiva Kumar and A. Venugopal Reddy, Effect of pressure assisted sintering on Fe-based composite material– a comprehensive evaluation, The Fourth Asian Particle Technology Symposium (APT 2009), New Delhi, India, 14-16th Sept 2009. (**Invited talk**)
15. M. Karanjai\*, A. Siva kumar, G. Babu and P.G Reddy, Sintering of cermet composites using a newly designed hot press, International conference and exhibition on PM in processing of particulate materials and products (PM10), Jaipur, India, 28-30th January 2010.
16. M. Karanjai\*, Composite Friction Materials, Powder metallurgy Short Course for Practicing Powder Metallurgists in Industries (PMSC), Pune, India, 9-11th October 2011, (**Invited talk**)
17. M. Karanjai\*, Y. Krishnapriya, D. Sen and A. Siva Kumar, Interdependence of sintering time- temperature-pressure on thermal behaviour of cermet friction composites, International conference & Exhibition on powder Metallurgy for Automotive and Engineering Industries-PM11, Pune, India, 2nd-4th February, 2011.
18. M. Karanjai\*, Future trends in design of friction materials for improved life and passenger comfort- A case study of 'Multi piston hot press (MPHP) for bonded cerametallic friction pads useful for clutch and brake applications, International conference & Exhibition on powder Metallurgy for Automotive and Engineering Industries-PM12, Mumbai, India, 3rd-5th February, 2012 (**Invited talk in plenary session**)
19. M. Karanjai\*, PM composite friction materials, Powder Metallurgy Short Course, Indian Institute of Technology-PM12, Mumbai, India, 15-18<sup>th</sup> March, 2012 (**Invited talk**)

20. M. Karanjai\* and A. Jyothirmayee, Corrosion aspects of cermet friction materials, International conference & Exhibition on powder Metallurgy for Automotive and Engineering Industries-PM13, Pune, India, 2<sup>nd</sup>-4<sup>th</sup> February, 2012 (**Plenary session talk**)

#### **List of Patents:**

1. B.I. Bondarenko, Y. Pokatilov, A. Sviatenko, D. Fedorov, Malobika K and A. Sivakumar, A method and apparatus for applying a protective carbon black coating on metallic surfaces, filed in 1999, patent application no. 719/MAS/1999, granted on 13/11/2007, patent grant no. 21192.
2. J. Pandurangam, Malobika. K, Process for carbothermic reduction of iron oxide in an immiscible flow with constant descent in vertical retort of silicon carbide, application No: 546/CHE/2003A, date of filing: 01/07/2003, Publication Date: 04/08/2006-granted.
3. Malobika. K, R. Sundaresan, T.R. Rama Mohan, B.P. Kashyap, Titanium based biocomposite material useful for orthopaedic and other implants and a process for its preparation, patent application no. 2490/DEL/2005, patent no. 228353, granted on 03/02/2009.
4. Malobika. K and A. Siva Kumar, 'A Process and a Multi Piston Hot Press for Producing Powder Metallurgy Components, such as Cerametallic Friction Composites', application no. 3844/DEL/2011, dtd. 28.12.2011.

#### **Affiliation to Professional Societies**

1. Life member of powder Metallurgy Association of India 'PMAI'
2. Life member of Magnetism Society of India

#### **Contact information**

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