

CSIR-NEERI

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Senior Scientist

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Academic Background

M. Sc. (Physical Chemistry) (University of Madras, India)

M. S (Physical Chemistry) (Shinshu University, Japan)

Ph.D (Physical Chemistry) (Shinshu University, Japan)

Professional Background

Senior Scientist: CSIR-NEERI, Chennai Zonal Centre (June, 2016 – Till date)

Scientist Fellow: CSIR-NEERI, Nagpur (April, 2013 – May 2016)

Research Scientist: Kanagawa University, Japan (Sep, 2012 – March, 2013)

Research Scientist: National Institute for Materials Science, Japan (April, 2009 – August, 2012)

Research Associate: Keio University, Japan (April, 2008 – March, 2009)

Area of Scientific Interest

Broad Area: Energy and Environmental remediation Materials

- Development of catalysts for automobile exhaust purification and Indoor air purification
- Development of electrode catalysts for cleaner energy generation using fuel cells

- Water and waste water treatment
- Development of oxygen carriers for carbondioxide capture and sequestration
- Characterization studies of emissions, river sediments, raw-materials for fire crackers
- Expert member for NGT hearings

Awards and Honors

- Monbu-kagakusho Fellow - Ministry of Education, Culture, Sports, Science, and Technology, Japan, 10, 2002 – 03, 2008
- Awarded as “Best Young Scientist” at “International Conference on Applications of Advanced Materials for Sustainable Development” held at Nagpur, India.
- Visiting Scientist – Kanagawa University, Yokohama, Japan.
- Awarded under *Fast Track Scheme for Young Scientist*

Publications

1. Rohini Khobragade, Divya Yearwar, Nitin Labhsetwar, **Govindachetty Saravanan,***
Alumina Supported Nano-platinum on Copper Nanoparticles Prepared via Galvanic Displacement Reaction for Preferential Carbon Monoxide Oxidation in Presence of Hydrogen
Int. J. Hydrog. Energy., (Accepted), IF = 4.084

2. Rohini Khobragade, Hisahiro Einaga, Suman Jain, **Govindachetty Saravanan,***
Nitin Labhsetwar
Sulfur Dioxide-tolerant Strontium Chromate for the Catalytic Oxidation of Diesel Particulate Matter
Catal. Sci. Technol., (Accepted), IF = 5.773

3. **Govindachetty Saravanan***, K. Pulleri Jayasree, Yearwar Divya, Mungse Pallavi, Labhsetwar Nitin
Ordered Intermetallic Pt-Fe Nano-catalysts for Carbon Monoxide and Benzene Oxidation
Intermetallics, 2018 (Accepted), IF = 3.140

4. Pallavi B. Mungse, **Govindachetty Saravanan***, Maiko Nishibori, Jan Subrt and Nitin K. Labhsetwar

Solvent-free, Improved Synthesis of Pure Phase of Iron Manganese mixed oxide, Bixbyite as Low-cost, Potential Oxygen Carrier for Chemical Looping with Oxygen Uncoupling

Pure Appl. Chem. **2017** (Accepted), IF = 3.386

5. Jayasree. K. Pulleri, D. Yearwar, **G. Saravanan**, S. Rayalu and Nitin Labhsetwar
Effect of Morphology of Platinum Nanoparticles on Benzene Oxidation Activity

J. Nanosci. Nanotech. **2016** (Accepted), IF = 1.338

6. Sandra Sajen, Sunit Kumar Singh, Pallavi Mungse, Sadhana Rayalu, Kosuke Watanabe, **Govindachetty Saravanan** and Nitin Labhsetwar*

Mechanically Stable Mixed Metal Oxide of Cu and Mn as Oxygen Carrier for Chemical Looping Syngas Combustion

Energy&Fuels, **2016**, 30, 7596-7603, IF = 2.835

7. **Govindachetty Saravanan***, Rohini Khobragade, Laxmi Chand Nagar, Nitin Labhsetwar

Ordered Intermetallic Pt-Cu Nanoparticles for Catalytic CO Oxidation Reaction

RSC Adv., **2016**, 6, 85634–85642, IF = 3.289

8. Pallavi Mungse, **Govindachetty Saravanan,*** Sadhana Rayalu and Nitin Labhsetwar*

Mixed Oxides of Fe and Mn as Low-cost, Potential Oxygen Carrier for Chemical Looping Combustion

Energy Technol, **2015**, 8, 3, 856-865. IF= 2.557, (ISSN: 2194-4296),

9. Nitin Labhsetwar, **Govindachetty Saravanan**, Suresh Kumar Megarajan, Nilesh Manwar, Rohini Khobragade, Pradeep Daggali, Fabien Grasset

Perovskite-type Catalytic Materials for Environmental Applications

Sci. Technol. Adv. Mater, **2015**, 3, 16, 036002. IF= 3.513 (ISSN: 1878-5514)

10. Takao Gunji, Toyokazu Tanabe, Arockiam John Jeevagan, Sho Usui, Takashi Tsuda, Shingo Kaneko, **Govindachetty Saravanan**, Hideki Abe, Futoshi Matsumoto*
Facile Route for the Preparation of Ordered Intermetallic Pt₃Pb-PtPb Core-Shell Nanoparticles and Its Enhanced Activity for Alkaline Methanol and Ethanol Oxidation
J. Power Sources, **2015**, 273, 990-998 IF: 6.333 (ISSN: 0378-7753)
11. Hideki Abe, Hideki Yoshikawa, Naoto Umezawa, Ya Xu, **Govindachetty Saravanan**, Gubbala V. Ramesh, Toyokazu Tanabe, Rajesh Kodyath, Shigenori Ueda, Nobuaki Sekido, Yoko Yamabe-Mitarai, Masahiko Shimoda, Takahisa Ohno, Futoshi Matsumoto, and Takayuki Komatsu
Correlation between the Surface Electronic Structure and CO-oxidation Activity of Pt Alloys
Phys. Chem. Chem. Phys., **2015**, 7, 17, 4879-4887; IF: 4.449 (ISSN 1463-9076)
12. Takao Gunji, Toyokazu Tanabe, **Govindachetty Saravanan**, Shingo Kaneko, Hideki Yoshikawa, Yoshitaka Matsushita, Nobuaki Sekido, Ya Xu, Shigenori Ueda, Hideki Abe, and Futoshi Matsumoto
Enhanced activity for oxygen reduction reactions by carbon-supported high-index-facet Pt-Ti nanoparticles
Electrochemistry, **2015**, 1, 83, 7-11, IF: 0.66 (ISSN: 2186-2451)
13. Pallavi Mungse, **Govindachetty Saravanan**,* Tomoki Uchiyama, Maiko Nishibori, Yasutake Teraoka, Sadhana Rayalu, and Nitin Labhsetwar*
Copper-Manganese Mixed Oxides: CO₂-selectivity, Stable, and Cyclic Performance for Chemical Looping Combustion of Methane
Phys. Chem. Chem. Phys., **2014**, 36, 16, 19634-19642; IF: 4.449 (ISSN 1463-9076)
14. Takao Gunji, Takashi Tsuda, Arockiam John Jeevagan, Masanari Hashimoto, Toyokazu Tanabe, Shingo Kaneko, Masahiro Miyauchi, **Govindachetty Saravanan**, Hideki Abe, and Futoshi Matsumoto
Visible Light Induced Decomposition of Organic Compounds on WO₃ Loaded PtPb Co-catalysts
Cat. Comm., **2014**, 56, 96-100; IF: 3.389 (ISSN: 1566-7367)

15. Nor A. Fadil, **Govindachetty Saravanan**, Gubbala V. Ramesh, Futoshi Matsumoto, Hideki Yoshikawa, Shigenori Ueda, Toyokazu Tanabe, Toru Hara, Shinsuke Ishihara, Hideyuki Murakami, Katsuhiko Ariga, and Hideki Abe
Synthesis and Electrocatalytic Performance of Atomically Ordered Nickel Carbide (Ni₃C) Nanoparticles
Chem. Commun., **2014**, 49, 50, 6451-6453; IF: 6.567, (ISSN 1364-548X) Royal Society of Chemistry (Highlighted as cover page article)
16. Francis Malar Auxilia, Shinsuke Ishihara, Saikat Mandal, Toyokazu Tanabe, **Govindachetty Saravanan**, Gubbala V. Ramesh, Naoto Umezawa, Toru Hara, Ya Xu, Shunichi Hishita, Yusuke Yamauchi, Arivuoli Dakshanamoorthy, Jonathan P. Hill, Katsuhiko Ariga,* and Hideki Abe*
Low-temperature remediation of NO catalyzed by interleaved CuO nanoplates
Adv. Mater. **2014**, 26, 26, 4481-4485., IF: 18.96 (ISSN: 1521-4095) (Highlighted as cover page article)
17. Takao Gunji, **Govindachetty Saravanan**,* Toyokazu Tanabe, Takashi Tsuda, Masahiro Miyauchi, Genki Kobayashi, Hideki Abe, and Futoshi Matsumoto
Long-term, Stable, and Improved Oxygen-Reduction Performance of Titania-supported PtPb Nanoparticles
Catal. Sci. Technol., **2014**, 5, 4, 1436-1455. IF: 5.287, (ISSN 2044-4761) Royal Society of Chemistry
18. Francis M. Auxilia, Toyokazu Tanabe, Shinsuke Ishihara, **Govindachetty Saravanan**, Gubbala V. Ramesh, Futoshi Matsumoto, Xu Ya, Katsuhiko Ariga, Arivuoli Dakshanamoorthy, Hideki Abe
Interleaved Mesoporous Copper for the Anode Catalysis in Direct Ammonium Borane Fuel Cells
J. Nanosci. Nanotech. **2014**, 6, 14, 4443-4448. IF: 1.556 (ISSN: 1533-4899)
19. **Govindachetty Saravanan**, Kazuya Nanba, Genki Kobayashi, and Futoshi Matsumoto
Leaching Tolerance of Anodic Pt-based Intermetallic Catalysts for Formic Acid

Oxidation

Electrochimica Acta **2013**, 99, 15-21. IF: 4.803 (ISSN: 0013-4686)

20. **Govindachetty Saravanan**,* Toru Hara, Hideki Yoshikawa, Yoshiyuki Yamashita, Shigenori Ueda, Keisuke Kobayashi and Hideki Abe,*

Post-synthesis Dispersion of Metal Nanoparticles by Poly(amidoamine) Dendrimers: Size-Selective Inclusion, Water Solubilization, and Improved Catalytic Performance
Chem. Commun., **2012**, 60, 48, 7441–7443. IF: 6.567 (ISSN 1364-548X) (Highlighted as cover page article)

21. **Govindachetty Saravanan*** and Hideki Abe*

Influence of pH on Dendritic Structure of Strongly Fluorescent Persulfate-treated Poly(amidoamine) Dendrimer

J. Photochem. Photobiol. A, **2011**, 224, 102-109. IF: 2.477 (ISSN: 1010-6030)

22. **Govindachetty Saravanan**, Kenji Daigo, Toyoko Imae, and Takao Hamakubo
Visual observation of avidin-biotin affinity by fluorescent G4.5 poly(amidoamine) dendrimer

Colloids and Surfaces B: Biointerfaces, **2011**, 83, 58-60. IF: 3.902 (ISSN: 0927-7765)

23. **Govindachetty Saravanan** and Toyoko Imae

Visual observation and characterization of fluorescent poly(amidoamine) dendrimer in film state

J. Nanosci. Nanotech. **2011**, 6, 11, 4838-4845. IF: 1.556 (ISSN: 1533-4899)

24. **Govindachetty Saravanan***, Hideki Abe*, Ya Xu, Nobuaki Sekido, Hirohito Hirata, Shin-ichi Matsumoto, Hideki Yoshikawa, and Yoko Yamabe-Mitarai

Pt₃Ti Nanoparticles: Fine Dispersion on SiO₂ Supports, Enhanced Catalytic CO Oxidation and Chemical Stability at Elevated Temperatures

Langmuir, **2010**, 13, 26, 11446-11451. IF: 3.993 (ISSN: 1520-5827)

25. Saikat Mandal, Marappan Sathish, **Govindachetty Saravanan**, K. K. R. Datta, Qingmin Ji, Jonathan P. Hill, Hideki Abe, Itaru Honma, and Katsuhiko Ariga

Open-Mouthed Metallic Microcapsules: Exploring Performance Improvement at

Agglomeration-Free Interiors

J. Am. Chem. Soc. **2010**, 41, 132, 14415-14417. IF: 13.038 (ISSN: 1520-5126)

26. **Govindachetty Saravanan**, Sumio Ozeki

Magnetic Field Control of Electron Tunneling Pathways in the Monolayer of (Ferrocenylmethyl)dodecyldimethylammonium Bromide on a Gold Electrode

J. Phys. Chem. B **2008**, 1, 112, 3-6. IF: 3.187 (ISSN: 1520-5207)

27. **Govindachetty Saravanan**, Katsuhiko Fujio, Sumio Ozeki

Magnetic Field Effects on Electric Behavior of $[Fe(CN)_6]^{3-}$ at Bare and Membrane-coated Electrodes

Sci. Technol. Adv. Mater. **2008**, 9, 1-7. IF: 3.513 (ISSN: 1878-5514)

Publications- Non-SCI Journals

1. Hideki Abe, **Govindachetty Saravanan**, Ya Xu, Nobuaki Sekido, Yoko Yamabe-Mitarai, and Masahiko Shimoda

Synthesis and Catalytic Performance of Intermetallic Nanoparticles

Materia **2010**, 49, 314-316.

2. Ichiro Otsuka, **Govindachetty Saravanan**, Yuta Honma, Sumio Ozeki, Takenori Nakayama, Tetsuro Hosogi, Akihiko Ishibashi

Corrosion Inhibition of Copper due to Magnetic Treatment of Water

Journal of the JRICu, **2007**, 46, 243-247.

3. Ichiro Otsuka, **Govindachetty Saravanan**, Sumio Ozeki, Takenori Nakayama, Tetsuro Hosogi, Chikara Saeki

Magnetic Treatment Effects of Water on Corrosion of Copper

Journal of the JRICu, **2006**, 45, 174-178.

Conference Proceedings

1. Arockiam John Jeevagan, Takao Gunji, Naoyuki Sawano, **Govindachetty Saravanan**, Taiki Kojima, Shingo Kaneko, Genki Kobayashi, Futoshi Matsumoto

Two-Step Microwave Synthesis of Highly Dispersed Ordered Intermetallic PtPb Nanoparticles on Carbon Black

ECS Trans. **2014**, *58*, (in press)

2. Arockiam John Jeevagan, Yukiko Suzuki, Takao Gunji, **Govindachetty Saravanan**, Yuta Irii, Takashi Tsuda, Toshiaki Onobuchi, Shingo Kaneko, Genki Kobayashi, Futoshi Matsumoto

Electrocatalytic Oxygen Reduction and Water-Oxidation on Transition Metal Ion-Doped MnO₂, RuO₂ and IrO₂ in Alkaline Aqueous Solutions

ECS Trans. **2014**, *58*, 25-31

3. Futoshi Matsumoto, **Govindachetty Saravanan**, Genki Kobayashi

Application of Ordered Intermetallic Phases to Electrocatalysis

ECS Trans. **2013**, *50*, 3-8.

4. Nor Akmal Fadil, **Govindachetty Saravanan**, Hideki Yoshikawa, Yoshiyuki Yamashita, Shigenori Ueda, Keisuke Kobayashi, Toyokazu Tanabe, Toru Hara, Gubbala Venkata Ramesh, Hideyuki Murakami, Kazuhiko Noda, Hideki Abe

Wet Chemical Synthesis of Ni-Al Nanoparticles at Ambient Condition

Advanced Materials Research, **2012**, *Vol. 557-559*, 442-447.

Book Chapter

1. Locomotive Catalytic Control Options for Diesel Particulate Emissions Including that from Locomotive Engines

Locomotives and Rail Road Transportation, pp 169-192, 11 February 2017

Sunit K. Singh, Rohini Khobragade, **Govindachetty Saravanan**, Avinash K. Agarwal, Ahmed S. AL-Fatesh, Nitin K. Labhasetwar

2. Analysis of AC impedance results of formic acid oxidation on electrode catalysts, Technical Information Institute Co., Ltd. Japan. 2013, p.386

Futoshi Matsumoto and **Govindachetty Saravanan**

Invited Lectures

1. 92nd Spring Meeting, The Chemical Society of Japan, held on 25~28-3-2012 at KeioUniversity, Yokohama, Japan. Invited Lecture entitled “**Intermetallic Pt₃Ti Nanoparticles: Efficient Catalytic Centers for Exhaust Purification and Energy Applications**”.

Govindachetty Saravanan

2. Tropo Mass Spectrometry (TMS) symposium held on 26th Jan 2013 at Kanagawa University, Japan. Invited lecture entitled “**Efficient approaches for the reduction in the amounts of platinum towards exhaust purification and fuel cell applications**”.

Govindachetty Saravanan

3. 16th National Workshop on “Catalysis for Sustainable Development” held on 4~5-2-2014 at CSIR-National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur, India. Invited Lecture entitled “**Efficient methods for the reduction in the amounts of platinum for catalytic applications**”

G. Saravanan

4. Self-sponsored workshop at VNIT-Nagpur. Invited lecture entitled “**Spectral Data Analysis and Spectral Interpretation for Structure Elucidation**”

G. Saravanan

5. Short Terms Training Program (STTP) on “Advances in Separation Technology” entitled “**Separation Techniques and Their Importance for Energy and Environmental-related Applications**”

G. Saravanan

6. NATIONAL SEMINAR ON RECENT ADVANCES IN CHEMISTRY (NSRAC)-2019, **Nano Platinum-based Intermetallic or Alloy Catalysts: Sustainable Option for Energy and Environmental Remediation Applications**

G. Saravanan

Patents

1. Labhasetwar Nitin Kumar, Govindachetty Saravanan, Rakesh Kumar, Khobragade Rohini Ashokrao “**Development of substituted perovskites for diesel soot oxidation and process for the preparation thereof**” 0186NF2017, 21st Nov. 2017 (Filed)

2. Hideki Abe, Francis Malar Auxilia, Shinsuke Ishihara, Toyokazu Tanabe, **Saravanan Govindachetty**, Gubbala Venkata Ramesh, Toru Hara, Ya Xu, Shunichi Hishita, Katsuhiko Ariga

Self-assembled single crystalline petal-like nanostructured catalyst and its preparation

JP 2012-115599, **May 21, 2012** (Filed)

3. Abe Hideki; Noor Akmal Phadil; Murakami Hideyuki; Yoshikawa Hideki; Yamashita Yoshiyuki; Ueda Shigenori; Tanabe Toyokazu; Gubbala Venkata Ramesh; Saravanan Govindachetty

Oxidation-resistant NiAl nanoparticle and method of producing the same, and oxidation-resistant NiAl nanoparticle-containing Bond coat layer

JP6099251, Mar 3, 2017. (**Granted**)

4. Abe Hideki; Noor Akmal Phadil; Murakami Hideyuki; Yoshikawa Hideki; Yamashita Yoshiyuki; Ueda Shigenori; Tanabe Toyokazu; Gubbala Venkata Ramesh; Saravanan Govindachetty, Ishihara Shinsuke, Ariga Katsuhiko

Small Diameter Ni₃C Nanoparticle And Production Method Of The Same

JP5991670, Aug 26, 2016. (**Granted**)

5. Hideki Abe, Hideyuki Murakami, Fadil Nor Akmal, **Saravanan Govindachetty**, Toyokazu Tanabe, Gubbala Venkata Ramesh

Electroless plating in non-aqueous solutions

JP 2012-115600, May 21, **2012** (Filed)

6. Hideki Abe, **Saravanan Govindachetty**, Toru Hara, Hideki Yoshikawa, Yoshiyuki Yamashita, Shigenori Ueda, Keisuke Kobayashi

Preparation of electrode catalyst comprising of nanoparticles encapsulated dendrimer and their assembly

JP 2012-090413, Apr 11, **2012**. (Filed)

7. Abe Hideki; Francis Malar Auxilia; Ishihara Shinsuke; Tanabe Toyokazu; Saravanan Govindachetty; Venkata Ramesh Gubbala; Hara Toru; Kyo Tsugi; Hishida Shunichi; Ariga Katsuhiko

Single nanocrystal board-accumulative catalyst

JP6099238, Mar 3, 2017. (**Granted**)

8. Hideki Abe, Ya Xu, Yoko Mitarai, Nobuaki Sekido, **Saravanan Govindachetty**
Exhaust gas cleaning catalyst and method of manufacturing the same

JP5798425, Aug 28, **2015**. (**Granted**)

9. Hideki Abe, **Saravanan Govindachetty**, Katsuhiko Ariga

Metallic cells

JP5818244, Oct 9, **2015**. (**Granted**)

10. Hideki Abe, **Saravanan Govindachetty**, Toru Hara, Hideki Yoshikawa, Keisuke Kobayashi, Yoshiyuki Yamashita, Shigenori Ueda

Preparation of Strongly Fluorescent Nanoparticles Encapsulated Dendrimer

JP 5728780, Apr 17, **2015**. (**Granted**)

11. Hideki Abe, Ya Xu, Yoko Mitarai, Nobuaki Sekido, **Saravanan Govindachetty**, Shin-ichi Matsumoto, Hirohito Hirata, **Supported catalyst**

JP 5623070, Oct 3, **2014**. (**Granted**)

Projects

On-going

1. Low-cost, Nano-Intermetallic / Alloy Catalysts as Promising Alternative to Expensive Platinum Catalyst for Fuel Cells (PI)
Science and Engineering Research Board, India

2. Development of Low-cost Oxidation Catalysts for Diesel Exhaust Emission Control (Co-PI)
Science and Engineering Research Board, India
3. Development of Novel Perovskite materials as a Suitable Candidate for Soot Oxidation (Co-PI)
Science and Engineering Research Board, India
4. A detail study to understand the non-putrefying property of River Ganga in both water and sediment (Component Lead)
NMCG, Ministry of water resources and river rejuvenation
5. Raw-material characterization of Fireworks (Component Lead)
CSIR
6. To prepare an action plan for remediation of entire affected Periyar river bodies/stretches including remediation of polluted stretch (Kuzhikandam Thodu), Kerala, Supervised Committee Member, NGT

Completed

1. Minimization of the amount of platinum for automobile exhaust treatments through intermetallics based catalysts, (PI)
Science and Engineering Research Board, India
2. Low-cost and shape-tailored Nano-catalysts for Volatile Organic Compounds Emission control (PI)
Nano mission/ Department of Science and Technology
3. Water quality monitoring and sediment analysis for the Ganga River from Gomukh to Gangasagar (Team Member)
NMCG, Ministry of water resources and river rejuvenation

4. TapCoal Project under 12th Five Year Plan. CSIR Network Project (Development of new/modified materials with high oxygen carrying capacity for chemical looping combustion (CLC). (Co-PI)
CSIR-Network project CSC-0102

Committee

Lifetime membership in

- CATALYSIS SOCIETY OF INDIA
- VIBHA