Curriculum Vitae

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Personal Data

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Research and Research Interests

-**Design and synthesis of nano-structured inorganic oxide materials**

Synthesis of highly porous inorganic oxide by precipitation, sol-gel, self-assembly, and supercritical drying methods: facile modification of morphology (particle size and particle shape), textural properties (surface area, pore volume, and pore size distribution), and chemical properties (acid/base and redox properties)

-**Chemical immobilization of metal component on the surface of nano-structured inorganic oxide materials for catalytic application**

Introduction of metal component by grafting/anchoring method: surface modification
One-pot synthesis of metal-/metal oxide-containing nano-structured inorganic oxide: size control of immobilized active metal species for suitable catalytic application

-**Practical application of nano-structured catalyst in the energy and environmental catalytic reaction**

Production of alternative fuel: hydrogen (reforming reaction; Ni-based catalyst), synthetic natural gas (methanation reaction; Ni-based catalyst), clean diesel/gasoline (Fischer-Tropsch reaction; Pd-based catalyst)
Carbon dioxide capture and conversion: solid adsorbent (IGCC application; alkali/alkaline earth metal-ceramic composite), synthetic gas (dry reforming; Ni-based catalyst), dimethyl carbonate (direct synthesis; acid catalyst)

- **Establishment of reaction mechanism by using various characterization techniques**
  - Temperature Programmed Techniques (TPR/TPO/TPD/TPSR)
  - Gas/Liquid Chromatography
  - Transmission Electron Spectroscopy, Scanning Electron Spectroscopy
  - Adsorption-desorption measurement (physisorption and chemisorption)

Publications
-International Journal (First authored "_" & Corresponding authored "_*")

1. R. Shavi, J.Ko, J.W. Han, **J.G. Seo***, "Quantitative Synthesis of Acetic Acid by Methane Conversion: A Kinetic and Mechanistic Insight" (submitted).

2. G.M. Thorat, H.S. Jadhav, **J.G. Seo***, "Hierachically Mesoporous MnCo2O4 Microspheres for High Electrochemical Performance in Supercapacitors and Methanol Electro-oxidation" (submitted).

3. V. Hiremath†, H.J. Kwon†, H.C. Lee, S. Kwon, S.H. Kwon, S.G. Lee, **J.G. Seo***, "Energetically Modified Basic Sites in MgO-Al2O3 for Ambient Temperature CO2 Adsorption" (submitted).

4. H. Lee, S. Hwang, H.S. Moon, S.G. Lee, **J.G. Seo***, "Carbon Dioxide Sorption Interface of Pseudo-Liquie Eutectic Mixture over Magnesium Oxide for Intermediate Temperature Capture" (submitted).

5. V. Hiremath, R. Shavi, **J.G. Seo***, "Controlled Oxidation State of Ti in MgO-TiO_2 Composite for CO_2 Capture", *Chemical Engineering Journal*, 15, pp. 177-183 (2017).

6. V. Hiremath†, S. Kwon†, S. Hwang, M. Cho, **J.G. Seo***, "Synthesis and Characterization of the Biological Waste E-coli Surface Modified with PEI for CO2 Adsorption" *RSC Advances*, 6, pp. 77535-77544 (2016).

7. H.S. Jadhav, S.M. Pawar, A.H. Jadhav, G.M. Thorat, **J.G. Seo***, "Hierarchical Mesoporous 3D Flower-like CuCO2O4/NF for High Performance Electrochemical Energy Storage" *Scientific Reports*, doi:10.1038/srep31120 (2016).

8. G.M. Thorat**,** A.H. Jadhav, H.S. Jadhav**,** K. Lee**, J.G. Seo***, "Template-free Synthesis and Characterization of Nickel Oxide Nanocrystal with High-energy Facets in Deep Eutectic Solvent", *Journal of Nanoscience and Nanotechnology*, 16, pp. 11009-11013 (2016).

9. R. Shavi**,** A.H. Jadhav**,** K. Lee, **J.G. Seo***, "Sulfonic Acid Functionalized Montmorillonite as an Efficient Acid Catalyst for Hydrogen Generation from Hydrolysis of Sodium Borohydride", *Journal of Nanoscience and Nanotechnology*, 16, pp.10980-10985 (2016).

10. H.S. Moon, S. Kwon, S.H. Kwon, M. Cho, **J.G. Seo***, S.G. Lee*, "A density Functional Theory Approach of CO_2 Adsorption on a Spinel Mineral: Determination of Binding Coordination", *RSC Advance*, 6, pp. 28067-28611 (2016).

11. A.H. Jadhav, A.C. Lim, G.M. Thorat, H.S. Jadhav, **J.G. Seo***, "Green Solvent Iolinc Liquids: Structural Directing Pioneers for Microwave Assisted Synthesis of Controlled MgO Nanostructures" *RSC Advances*, 6, pp. 31675-31686 (2016).

12. A.H. Jadhav, G.M. Thorat, K. Lee, A.C. Lim, H. Kang, **J.G. Seo***, " Effect of Anion Type of Imidazolium Based Polymer Supported Ionic Liquids on the Solvent Free Cycloaddtion of CO_2 into Epoxide " *Catalysis Today, 265, pp. 56-67* (2016).

13. V. Hiremath, A.H. Jadhav, H. Lee, S. Kwon, **J.G. Seo***, "Highly Reversible CO_2 Capture using Amino Acid Functionalized Ionic Liquids Immobilized on Mesoporous Silica" *Chemical Engineering Journal, 287, pp. 602-617 (2016)*

14. H.S. Jadhav, G.M. Thorat, J. Mun*, **J.G. Seo***, "Self-assembled Hierarchical 3D-NiO Microspheres with Ultra-thin Porous Nanoflakes for Lithium-ion Batteries" *Journal of Power Sources, 302, pp. 13-21 (2016*).

15. N. Mittal, G.M. Nisola, **J.G. Seo***, S.-P. Lee, W.-J. Chung, "Organic Radical Funcionalized SBA-15 as a Heterogeneous Catalyst for Facile Oxidation of 5-Hydroxymethylfufural to 2,5-Diformylfuran", *Journal of Molecular Catalysis A: Chemical*, 404, pp. 106-114 (2015).

16. A.H. Jadhav, K. Lee, S. Koo, **J.G. Seo***, "Esterification of Carboxylic Acids with Alkyl Halides Using Imidazolium Based Dicationic Ionic Liquids Containing bis-trifluoromethane Sulfonimide Anions at Room Temperature", *RSC Advances*, 5, pp, 26197-26208 (2015).

17. S.J. Han, Y. Bang, H. Lee, K. Lee, I.K. Song, **J.G. Seo***, "Synthesis of a Dual Templated MgO-Al_2O_3 Using Block Copolymer and Ionic Liquid for CO_2 Capture", *Chemical Engineering Journal*, 270, pp. 411-417 (2015).

18. A. H. Jadhav, H. Zhang, F.O. Agyemang, V. Hiremath, K. Lee, J. Chandradass, **J.G. Seo***, H. Kim*, "Preparation and Characterization of Electro-spun Fabricated Ag-TiO_2 Composite Nanofibers and its Enhanced Photo-Catalytic Activity for the Degradation of Congo Red", *Journal of Nanoscience and Nanotechnology*, 15, pp. 7988-7996 (2015).

19. A. H. Jadhav, X.T. Mai, R. Appiah-Ntiamoah**,** H. Lee, F.W.Y. Momade, **J.G. Seo***, H. Kim*, "Preparation and Characterization of Palmitoyl Grafted Cellulose Nano Absorbent for the Efficient Adsorption of Pyrene from Aqueous Solution", *Journal of Nanoscience and Nanotechnology*, 15, pp. 7980-7987 (2015).

20. A.H. Jadhav**,** A. Chinnappan**,** V. Hiremath, **J.G. Seo***, "Synthesis and Characterization of $AlCl_3$Impregnated Molybdenum Oxide as Heterogeneous Nano-Catalysts for the Friedel-Crafts Acylation Reaction in Ambient Condition", Journal of Nanoscience and Nanotechnology, 15, pp. 8243-8250 (2015).

21. Y. Bang, S.J. Han, S. Kwon, V. Hiremath, I.K. Song, **J.G. Seo***, "High Temperature Carbon Dioxide Capture on Nano-Structured MgO-Al_2O_3 and CaO-Al_2O_3 Adsorbents: An Experimental and Theoretical Study", *Journal of Nanoscience and Nanotechnology*, 14(11), pp. 8531-8538 (2014).

22. S.J. Han, Y. Bang, H.J. Kwon, H.C. Lee, V. Hiremath, I.K. Song, **J.G. Seo***, "Elevated Temperature CO_2 Capture on Nano-Structured MgO-Al_2O_3 Aerogel: Effect of Mg/Al Molar Ratio" *Chemical Engineering Journal*, 242, pp. 357-363 (2014).

23. Y.J. Lee, G.-P. Kim, Y. Bang, J. Yi, **J.G. Seo***, I.K. Song, "Activated Carbon Aerogel Containing Graphene as Electrode Material for Supercapacitor", *Materials Research Bulletin*, 50, pp.240-245 (2014).

24. S.J. Han, Y. Bang, J. Yoo, K.H. Kang, J.H. Song, **J.G. Seo***, I.K. Song, "Hydrogen Production by Steam Reforming of Ethanol over Mesoporous Ni-Al_2O_3-ZrO_2 Aerogel Catalysts", *International Journal of Hydrogen Energy*, 38, pp.15119-15127 (2013).

-International Journal (Co-authored "_")

1. L.A. Limjuco, G.M. Nisola, C.P. Lawagon, S.P. Lee, **J.G. Seo**, H. Kim, W.-J. Chung, "H2TiO3 Composite Adsorbent Foam for Efficient and Selevtive Li+ Recovery from Secondary Resources" (submitted).

2. L. Malihan, G.M. Nisola, N. Mittal, S.P. Lee, **J.G. Seo**, H. Kim, W.-J. Chung, "SBA-15 Supported Ionic Liuqid Phase (SILP) with H2PW12O40- for the Hydrolytic Catalysis of Red Macroalgal Biomass to Sugars" *RSC Advances*, 6, pp. 33901-33909 (2016).

3. H.S. Jadhav, R.S. Kalubarme, A.H. Jadhav, **J.G. Seo**, "Highly Stable Bilayer of LiPON and B_2O_3 Added $Li_{1.5}Al_{0.5}Ge_{1.5}(PO_4)$ Solid Electrolytes for Non-aqueous Rechargeable Li-O_2 Batteries", *Electrochimica Acta*, 199, pp. 126-132 (2016).

4. M.J. Park, G.M. Nisola, E.L. Vivas, L.A. Limjuco, C.P. Lawagon, **J.G. Seo**, H. Kim, H.K. Shon, W.-J. Chung, "Mixed Matrix Nanofiber as a Flow-through Membrane Adsorber for Continuous Li+ Recovery from Seawater", *Journal of Membrane Science*, 510, pp. 141-154 (2016).

5. N. Mittal, G.M. Nisola, L. Malihan, **J.G. Seo**, H. Kim, W.-J. Chung, "One-pot Synthesis of 2, 5-Diformylfuran from Fructose Using a Magnetic Bi-functional Catalyst", *RSC Advances*, 6, pp. 25678-25688 (2016).

6. C.P. Lawagon, G.M. Nisola, J. Mun, A. Tron, R.E.C. Torrejos, **J.G. Seo**, H. Kim, W.-J. Chung, "Adsorptive Li+ Mining from Liquid Resources by H_2TiO_3: Equilibrium, Kinetics, Thermodynamics, and Mechanisms", *Journal of Industrial and Engineering Chemistry*, 35, pp. 347-356 (2016).

7. H.S. Jadhav*****, R.S. Kalubame, A.H. Jadhav, **J.G. Seo**, "Iron-nickel Spinel Oxides as an Electrocatalyst for Non-aqueous Rechargeable Lithium-oxygen Batteries", *Journal of Alloys and Compounds, 666, pp. 476-481 (2016)*

8. J.S. Yeon, W.R. Lee, H. Jo, H. Lee, J.H. Song, K.S. Lim, D.W. Kang, **J.G. Seo**, D.M. Moon, B. Wiers, C.S. Hong*, "Homodiamine-Functionalized Metal-Organic Frameworks with MOF-74-Type Extended Structure for Superior Selectivity of CO_2 over N_2", *Journal of Materials Chemistry A*, 3, pp. 19177-19185 (2015).

9. W.R. Lee, H.A. Jo, L.M. Yang, H. Lee, D.W. Ryu, K.S. Lim, J.H. Song, D.Y. Min, S.S. Han, **J.G. Seo**, Y.K. Park, D.H. Moon, C.S. Hong*, "Exceptional CO_2 Working Capacity in a Heterodiamine-Grafted Metal-Organic Framework", *Chemical Science*, 6, pp. 3697-3705 (2015).

10. G.M. Nisola, A.B. Beltran, M.J. Park, R.E. Torrejos, **J.G. Seo**, S. -P. Lee, W. -J. Chung*, "Composite Membranes with Surface-Modifying Macromolecules for Halogenated Hydrocarbons Removal from Water in Membrane Extraction Process", *Desalination and Water Treatment*, pp. 1-9 (2015).

11. H. Kang, J.M. Lee, J.-H. Kim, J.-H. Lee, J.S. Park, **J.G. Seo**, D. Kang, "Homeotropic Alignment Properties of Liquid Crystal and Photocurable Monomer System via UV Irradiation", M*olecular Crystals and Liquid Crystals*, 606, pp. 101-110 (2015).

12. R.E.C. Torrejos, G.M. Nisola, M.J. Park, H.K. Shon, **J.G. Seo**, S. Koo, W.-J. Chung, "Synthesis and Characterization of multi-walled carbon nanotubes-supported dibenzo-14-crown-4 ether with proton ionizable carboxyl sidearm as Li^+ adsorbents" *Chemical Engineering Journal*, 264, pp. 89-98 (2015).

13. Y. Ju, D. Miao, **J.G Seo**, S. Koo*****, "Catalytic Oxidation of β-Keto Esters by Manganese(III)/Cobalt(II) and Consecutive Cyclization to Heterocycles", Advanced Synthesis & Catalysis, 14-15, pp. 3059-3066 (2014)

14. R.E.C. Torrejos, G.M. Nisola, M.J. Park, A.B. Beltran, **J.G. Seo**, S.-P, Lee, W.-J. Chung, "Liquid-liquid Extraction of Li+ using Mixed Ion Carrier System at Room Temperature Ionic Liquid", *Desalination and Water Treatment*, pp. 1-8 (2014).

15. M.J. Park, G.M. Nisola, A.B. Beltran, R.E.C. Torrejos, **J.G. Seo**, S.-P. Lee, H. Kim, W.-J. Chung, "Recyclable Composite Nanofiber Adsorbent for Li^+ Recovery from Seawater Desalination Retentate" *Chemical Engineering Journal*, 254, pp. 73-81 (2014).

16. N. Mittal, G.M. Nisola, L.B. Malihan, **J.G. Seo**, W.-J. Chung, "Metal-Free Mild Oxidation of 5-Hydroxymethylfurfural to 2,5-Diformylfuran", *Korean Journal of Chemical Engineering*, 31(4), pp. 1362-1367 (2014).

17. R.E.C. Torrejos, G.M. Nisola, A.B. Beltran, M.J. Park, B.R. Patil, S.-P. Lee, **J.G. Seo**, W.-J. Chung, "Microwave-Assisted Synthesis of Dibenzo-Crown Ethers", *Letters in Organic Chemistry*, 11, pp. 109-115 (2014).

18. L.B. Malihan, G.M. Nisola, N. Mittal, **J.G. Seo**, W.-J. Chung, "Blended Ionic Liquid Systems for Macroalgae Pretreatment", *Renewable Energy*, 66, pp. 596-604 (2014).

19. Y. Bang, S.J. Han, J. Yoo, J.H. Choi, K.H. Kang, J.H. Song, **J.G. Seo**, J.C. Jung, I.K. Song, "Hydrogen Production by Steam Reforming of Liquefied Natural Gas (LNG) over Trimethylbenzene-assisted Ordered Mesoporous Nickel-alumina Catalyst", *International Journal of Hydrogen Energy*, 38(21) pp. 8751-8758.

20. S.J. Han, Y. Bang, J. Yoo, **J.G. Seo**, I.K. Song, "Hydrogen Production by Steam Reforming of Ethanol over Mesoporous Ni-Al_2O_3-ZrO_2 Xerogel Catalysts: Effect of Nickel Content", *International Journal of Hydrogen Energy*, 38(20), pp. 8285-8292.

21. S. Hwang, U.G. Hong, J. Lee, **J.G. Seo**, J.H. Baik, D.J. Koh, H. Lim, I.K. Song, "Methanation of Carbon Dioxide over Mesoporous Ni-Fe-Al_2O_3 Catalysts Prepared by a Coprecipitation Method: Effect of Precipitation Agent", *Journal of Industrial and Engineering Chemistry*, 19(6), pp.2016-2021 (2013).

22. H. Kang, **J.G. Seo**, D. Kang, J.-C. Lee, "Liquid Crystal Alignment Properties of Poly(styrenesulphonate)/alkyltrimethlammonium Complexes", *Liquid Crystals*, 40(4), pp.492-498 (2013.04.02).

23. S.J. Han, Y. Bang, **J.G. Seo**, J. Yoo, I.K. Song, "Hydrogen Production by Steam Reforming of Ethanol over Mesoporous Ni-Al_2O_3-ZrO_2 Xerogel Catalysts: Effect of Zr/Al Molar Ratio", *International Journal of Hydrogen Energy*, 38(3), pp.1376-1383 (2013.01.01).

24. Y. Bang, S.J. Han, **J.G. Seo**, M.H. Youn, J.H. Song, I.K. Song, "Hydrogen Production by Steam Reforming of Liquefied Natural Gas (LNG) over Ordered Mesoporous Nickel-alumina Catalyst", *International Journal of Hydrogen Energy*, 37(22), pp.17967-17977 (2012.12.01).