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Research areas : Semiconductor nanostructures,
Third generation solar cells,
Solvothermal based nanostructures synthesis

Title of the research: Synthesis of semiconductor-based nanostructures for the Electron Transport Layers of Dye-sensitized solar cells and Perovskite solar cells

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Current position : Assistant Professor, Department of Physics, Dr. N.G.P. Arts and Science College, Coimbatore

Description of current and past research:

Ph.D research work was focused on photoanodes for dye-sensitized solar cells (DSSC). Specifically, TiO_2 nanostructures were synthesized by wet chemical techniques such as solvothermal and microwave methods. The performance of these prepared nanostructures as photoanodes in DSSCs was studied. Have also studied the effect of modifications of TiO_2 such as non-metal doping (F, N), plasmonic enhancement (Ag), and as composites (RGO/TiO_2) on the performance of dye-sensitized solar cells. Experimental techniques such as solvothermal method, microwave assisted solvothermal method, UV- aided photo reduction technique was conducted. Carried out part of my research work at Western Norway University of Applied Sciences, Norway under the supervision of Prof. Dhayalan Velauthapillai. Currently I am focusing on inorganic perovskite solar cells.

Journal publications:

International:

1. Transformation of TiO_2 nanoparticles to nanotubes by simple solvothermal route and its performance as Dye-sensitized solar cells (DSSC) photoanodes, **Venkatraman Madurai Ramakrishnan**, Muthukumarasamy Natarajan, P. Balraju, P. Selvakumar, Agilan Santhanam, Dhayalan Velauthapillai, Arivalagan Pugazhendhi, International Journal of Hydrogen Energy, Volume 45, Issue 31, Pages 15441-15452, (2020). (IF- 5.8)

2. Performance of simple green synthesized Ag incorporated TiO_2 nanoparticles based photoanodes by doctor-blade coating as working electrodes for dye sensitized solar cells, Rajkumar Senthamarai, **Venkatraman Madurai Ramakrishnan**, K. Suguna, P. Karuppasamy, Muthu Senthil Pandian, P. Ramasamy, Journal of Materials Science: Materials in Electronics, **Just Accepted (2021)**. (IF- 2.47)

3. Synthesis of Ag incorporated TiO_2 nanoparticles by simple green approach as working electrode for dye sensitized solar cells, Rajkumar Senthamarai, **M.R. Venkatraman**, Balraju Palanisamy, K. Suguna, Arivalagan Pugazhendhi, Progress in Organic Coatings, **Just Accepted (2021)**. (IF- 5.16)

4. Synthesis and characterization of Nickel doped TiO_2 nanoparticles by green route and its performance as dye sensitized solar cells photoanodes, S. Rajkumar, **M. R. Venkatraman**, M. Prabhu, P. M. Anbarasan, K. Suguna, International Journal of Energy Research, **Just Accepted (2021)**. (IF- 5.1)

5. UV-aided Graphene Oxide Reduction by TiO_2 towards TiO_2/Reduced Graphene Oxide (RGO) Composites for Dye-sensitized solar cells, **Venkatraman Madurai Ramakrishnan**, Muthukumarasamy Natarajan, P. Selvakumar, Agilan Santhanam, Dhayalan Velauthapillai, Arivalagan Pugazhendhi, International Journal of Energy Research, Volume 45, Issue 12, Pages 17220-17232, (2020). (IF- 5.1)

6. Interfacing green synthesized flake like-ZnO with TiO_2 for bilayer electron extraction in perovskite solar cells, Selvakumar P, Nandhakumar E, Muthukumarasamy N, Agilan Santhanam, Vijayshankar Asokan, **Venkatraman Madurai Ramakrishnan**, Balraju P, Anandhi K, Dhayalan Velauthapillai, New Journal of Chemistry, Volume 44, Issue 20, Pages 8422-8433, (2020). (IF-3.6)

7. Performance of TiO_2 nanoparticles synthesized by microwave and solvothermal methods as photoanodes for Dye-sensitized solar cells (DSSC), **Venkatraman Madurai Ramakrishnan**, P. Selvakumar, N. Muthukumarasamy, Kristin Kvamme, G. Rajesh, S. Agilan, Arivalagan Pugazhendhi, Dhayalan Velauthapillai, International Journal of Hydrogen Energy, Volume 45, Issue 51, Pages 27036-27046, (2020). (IF- 5.8)

8. Microwave Assisted Solvothermal Synthesis of Quasi Cubic F Doped TiO_2 Nanostructures as Dye Sensitized Solar Cells photoanodes, **Venkatraman Madurai Ramakrishnan**, Muthukumarasamy Natarajan, Agilan Santhanam, Dhayalan Velauthapillai, Arivalagan Pugazhendhi, International Journal of Energy Research, Volume 45, Issue 12, Pages 17259-17268, (2020). (IF- 5.1)

9. Perovskite Solar Cells: A Porous Graphitic Carbon-based Hole Transporter/Counter Electrode Material Extracted from an Invasive Plant Species Eichhornia Crassipes, Selvakumar P, Nandhakumar E, Muthukumarasamy N, Agilan Santhanam, Vijayshankar Asokan, **Venkatraman Madurai Ramakrishnan**, Balasundaraprabhu Rangasamy, Senthilarasu Sundaram, Dhayalan Velauthapillai, Scientific Reports, 10, Article number: 6835, (2020). (IF-3.99)

10. Microwave Assisted Solvothermal synthesis of worms-like TiO_2 Nanostructures in Submicron Regime as Light Scattering Layers for Dye- Sensitized Solar Cells, **Venkatraman Madurai Ramakrishnan**, Sondre Sandberg, N. Muthukumarasamy, Kristin Kvamme, P. Balraju, S. Agilan, Dhayalan Velauthapillai, Materials Letters, Volume 236, Pages 747-751, (2019). (IF-3.4)

11. Size controlled synthesis of TiO_2 nanoparticles by modified solvothermal method towards effective photo catalytic and photovoltaic applications, **Venkatraman Madurai Ramakrishnan**, Muthukumarasamy Natarajan, Agilan Santhanam, Vijayshankar Asokan, Dhayalan Velauthapillai, Materials Research Bulletin, Volume 97, Pages 351-360, (2018). (IF-4.6)

12. A Review on the Classifications of Organic/Inorganic/Carbonaceous Hole Transporting Materials for Perovskite Solar Cell Application, Selvakumar Pitchaiya, Muthukumarasamy Natarajan, Agilan Santhanam, Vijayshankar Asokan, Akila Yuvapragasam, **Venkatraman Madurai Ramakrishnan**, Subramaniam E Palanisamy, Senthilarasu Sundaram, Dhayalan Velauthapillai, Arabian Journal of Chemistry, Volume 13, Issue 1, Pages 2526-2557, (2020). (IF- 5.1)

13. Synthesis of TiO_2 nanostructures by green approach as photoanodes for dye-sensitized solar cells, Rajkumar Senthamarai, **Venkatraman Madurai Ramakrishnan**, Balraju Palanisamy, Suguna Kulandhaivel, International Journal of Energy Research, Volume 45, Issue 2, Pages 3089-3096, (2021). (IF- 5.1)

14. The Performance of $CH_3NH_3PbI_3$- Nanoparticles based – Perovskite Solar Cells Fabricated by Facile Powder press Technique, Selvakumar P, N. Muthukumarasamy, Agilan Santhanam, Vijayshankar Asokan, **Venkatraman Madurai Ramakrishnan**, Selvaraj Yuvaraj, Akila Yuvapragasam, Balasundaraprabhu Rangasamy, Senthilarasu Sundaram, Dhayalan Velauthapillai, Materials Research Bulletin, Volume 108, Pages 61–72, (2018). (IF-4.6)

15. Nickel sulphide-carbon composite hole transporting material for ($CH_3NH_3PbI_3$) planar heterojunction perovskite solar cell, Selvakumar Pitchaiya, Muthukumarasamy Natarajan, Agilan Santhanam, **Venkatraman Madurai Ramakrishnan**, Vijayshankar Asokan, Pavithrakumar Palanichamy, Balasundaraprabhu Rangasamy, Senthilarasu Sundaram, Dhayalan Velauthapillai: Materials Letters, Volume 221, Pages 283–288, (2018). (IF-3.4)

16. Investigations on Hot-wall deposited Cadmium Sulphide buffer layer for thin film solar cell, G. Balaji, R. Balasundaraprabhu, S. Prasanna, N. Prabavathy, **M.R. Venkatraman**, Vijayshankar Asokan, N. Muthukumarasamy, M.D. Kannan, K. Sivakumaran, Materials Letters, Volume 222, Pages 82–87, (2018). (IF-3.4)

17. The performance of CdS quantum dot sensitized ZnO nanorod-based solar cell, D. Vinoth Pandi, N. Muthukumarasamy, S. Agilan, **M. R. Venkatraman**, Y. Akila, Dhayalan Velauthapillai, Journal of Sol-Gel Science and Technology, Volume 80, Pages 867–872, (2016). (IF- 2.3)

18. Structural, optical and magnetic properties of undoped NiO and Fe doped NiO nanoparticles synthesized by wet-chemical process, P.M. Ponnusamy, S. Agilan, N. Muthukumarasamy, T.S. Senthil, G. Rajesh, **M.R. Venkatraman**, Dhayalan Velauthapillai, Materials Characterization, Volume 114, Pages 166-171, (2016). (IF- 4.3)

19. Solution based synthesis of high yield CZTS (Cu_2ZnSnS_4) spherical quantum dots, G. Rajesh, N. Muthukumarasamy, E.P. Subramanian, **M.R. Venkatraman**, S. Agilan, V. Ragavendran, M. Thambidurai, S. Velumani, Junsin Yi, Dhayalan Velauthapillai, Superlattices and Microstructures, Volume 77, Pages 305-312, (2015). (IF- 2.6)