Journal of Nanosciences: Current Research
ISSN 2572-0813
2020
Vol.5 No.5

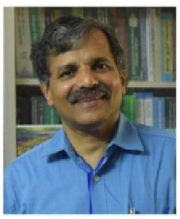
New Opportunities in Sustainable Materials

Sabu Thomas

Mahatma Gandhi University, India

Abstract

Green chemistry started for the search of benign methods for the development of nanoparticles from nature and their use in the field of antibacterial, antioxidant, and antitumor applications. Bio wastes are eco-friendly starting materials to produce typical nanoparticles with well-defined chemical composition, size, and morphology. Cellulose, starch, chitin and chitosan are the most abundant biopolymers around the world. All are under the polysaccharides family in which cellulose is one of the important structural components of the primary cell wall of green plants. Cellulose nanoparticles(fibers, crystals and whiskers) can be extracted from agrowaste resources such as jute, coir, bamboo, pineapple leafs, coir etc. Chitin is the second most abundant biopolymer after cellulose, it is a characteristic component of the cell walls of fungi, the exoskeletons of arthropods and nanoparticles of chitin (fibers, whiskers) can be extracted from shrimp and crab shells. Chitosan is the derivative of chitin, prepared by the removal of acetyl group from chitin (Deacetylation). Starch nano particles can be extracted from tapioca and potato wastes. These nanoparticles can be converted into smart and functional biomaterials by functionalisation through chemical modifications (esterification, etherification, TEMPO oxidation, carboxylation and hydroxylation etc) due to presence of large amount of hydroxyl group on the surface. The preparation of these nanoparticles include both series of chemical as well as mechanical treatments; crushing, grinding, alkali, bleaching and acid treatments. Transmission electron microscopy (TEM), scanning electron microscopy (SEM) and atomic force microscopy (AFM) are used to investigate the morphology of nanoscale biopolymers. Fourier transform infra-red spectroscopy (FTIR) and x ray diffraction (XRD) are being used to study the functional group changes, crystallographic texture of nanoscale biopolymers respectively. Since large quantities of bio wastes are produced annually, further utilization of cellulose, starch and chitins as functionalized materials is very much desired. The cellulose, starch and chitin nano particles are currently obtained as aqueous suspensions which are used as reinforcing additives for high performance environment-friendly biodegradable polymer materials.



Biography:

Sabu Thomas is serving as the vice-chancellor of Mahatma Gandhi University, Kerala. He is also a full professor (25 March 1998 onwards) of Polymer Science and Engineering at the School of Chemical Sciences. He was the Pro-Vice Chancellor of Mahatma Gandhi University, Kerala during the period of 31 August 2017 to 31 August 2018, Director of School of Chemical Science during the period of 1 November 2010 to 31 December 2013. Hon. Director of International & Inter-University Centre for Nanoscience and Nanotechnology during the period of 28 March 2009 to 11 September 2015, 2 February 2016 to 11 October 2017.

Speaker Publications:

1. Ultra-Fast Heat Dissipating Aerogels Derived from Polyaniline Anchored Cellulose Nanofibers as Sustainable Microwave Absorbers.Pai, A. R., Binumol, T., Gopakumar, D. A., Pasquini, D., Seantier, B., Kalarikkal, N., & Thomas, S. (2020). Carbohydrate Polymers, 116663.
2. Nano formulated proanthocyanidins as an effective wound healing componen Rajakumari, R., Volova, T., Oluwafemi, O. S., Rajeshkumar, S., Thomas, S., & Kalarikkal, N. (2020). t. Materials Science and Engineering: C, 106, 110056.
3. Reliable optoelectronic switchable device implementation by CdS nanowires conjugated bent-core liquid crystal matrix. Asiya, S. I., Pal, K., El-Sayyad, G. S., Abd Elkodous, M., Demetriades, C., Kralj, S., & Thomas, S. (2020). Organic Electronics, 82, 105592.
4. Flexible dopamine-functionalized BaTiO3/BaTiZrO3/BaZrO3-PVDF ferroelectric nanofibers for electrical energy storage.Mayeen, A., Kala, M. S., Sunija, S., Rouxel, D., Bhowmik, R. N., Thomas, S., & Kalarikkal, N. (2020). Journal of Alloys and Compounds, 155492.

5. Sodium itaconate grafted nanocellulose for facile elimination of lead ion from water Vadakkekara, G. J., Thomas, S., & Nair, C. R. (2020). Cellulose, 1-16.

21st World Congress on Materials Science and Engineering; Webinar - June 22-23, 2020.

Abstract Citation:

Sabu Thomas, New Opportunities in Sustainable Materials, Advanced Materials -2020, 25th International Conference on Advanced Materials & Nanotechnology; Webinar - November 23-24, 2020

(https://europe.materialsconferences.com/abstract/2020/new-opportunities-in-sustainable-materials)