International Journal of Chemical Sciences

Recent Advances In The Development Of Supercapacitor Employing Nanocellulose Based Polymer Nanocomposites

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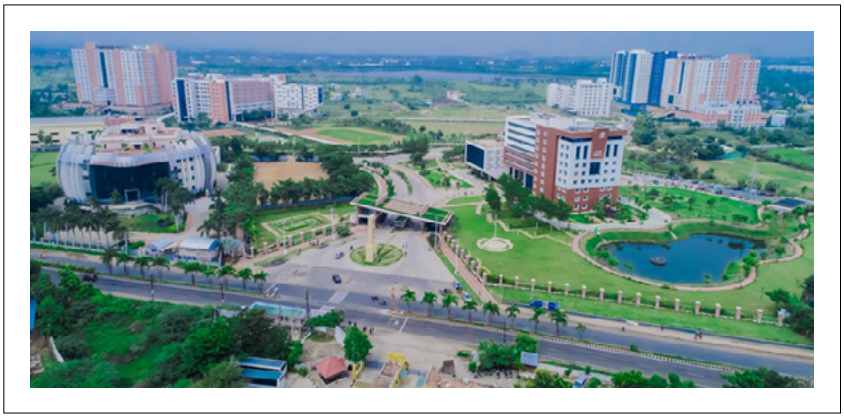
Abstract

With rapid fossil fuel consumption and ecological concerns, alternative options of green energy development and its efficient storage technology is an emergent area of research. Nanocellulose (NC) is observed a very-promising, sustainable and environmentally friendly nanomaterial for green and renewable electronics for advanced electrochemical energy conservation devices like supercapacitors. It can be used in making of separator, electrolyte, or electrode as well. The nano-order scale of NC offers a very high surface area that assists in controlling the pore structure in separators. It offers a perfect diffusion path for an electrolytic solution and facilitates the transport of ions. If used as an electrode, NC provides mechanical strength and flexibility to such electrodes (films or aerogels) and improves its capacitive performance. Conductivity of such an electrode can be increased by loading it with conductive carbonaceous materials like CNTs, graphene oxides (GO) etc. The pore size and its distribution in NC affect the electrolyte uptake, ionic conductivity and hence the performance of supercapacitor. It is very much required to control these parameters and prevent the collapse of the web structure of NC for improved performance in energy storage systems in 2D structures. To enhance the energy density further, the design and manufacturing aspects of nanocellulose based aerogels and 3D structures are also being explored recently. More efforts in the development of industrially viable processing technique that can manufacture big sized electrodes are required. Author will discuss some ideas of manufacturing large sized electrodes. Definitely, challenges are there and more efforts are required to warrant such sustainable materials in energy applications keeping in mind the environmental protection. At a first place, high manufacturing cost and time are still the concerns with nanocellulose production. New ways to produce nanocellulose with large scalability and low cost should come up.

Biography

Sandeep Ahankari is working as an associate professor in the school of mechanical engineering at vit university, vellore, tn, India. He is basically a mechanical engineer, pursued his PhD from IIT kanpur, india in the area of functionally graded polymer composites and postdoctoral research at university of guelph, on, Canada. His area of interest includes- processing and thermo-mechanical characterization of bio/polymer nanocomposites, functionally graded composites, etc. He has nine international journal papers, twenty international conference papers, five international book chapters to his credit. He filed five patents and one invention of which three are granted.



Abstract Citation: Sandeep S Ahankari, Recent advances in the development of supercapacitor employing nanocellulose based polymer nanocomposites, Biopolymer Congress 2020, World Congress on Biopolymers and Bioplastics, August 27-28, 2020, Webinar, 07