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Carbon-based Materials will be used in Future Photonics and Electronics Comparison

Bronson Emers*

Department of Photonics, University of Portland, Portland, USA

Description

Mesoporous carbon-based materials have been extensively utilized in the removal of aqueous resistant contaminants due to their distinctive chemical properties, which include a large surface area, organized mesoporous structure, and variable pore size. Using a variety of functionalized mesoporous carbon-based materials, this chapter introduces the synthesis techniques and characteristics of pure mesoporous carbons, metallic modified carbons, and non-metallic functionalized carbons [1]. In addition, in-depth research and discussion are given to the question of whether or not any of the three kinds of mesoporous carbon-based materials can be used to remove refractory pollutants. Most of the time, pure mesoporous carbons are used as adsorbents, persulfate catalyst activators, and microbial fuel cell catalysts. Additionally, non-metallic modified carbons, heteroatom-incorporated mesoporous carbons, mesoporous carbon immobilized enzymes, and adsorbents are utilized [2].

Carbon-based materials have demonstrated a great deal of adaptability because they can be chemically combined with other carbon-based materials and a variety of elements to create strong covalent bonds. They have outstanding properties like high density, hardness, and strength [3]. Their invention, research, and development take place across a wide range of fields. Research on carbon-based materials has produced a number of favorable results for a wide range of structures, making it possible to produce a variety of materials with a variety of uses. Recent research indicates that materials based on carbon nanotubes and graphene perform exceptionally well in the face of the challenges we face now and will face in the future if we do not prioritise the research and development of new technologies to reduce, if not eliminate, our current severe environmental impacts.

Our study will concentrate on potential solutions to these problems, such as CO2 reduction, H2 photoelectrogeneration, batteries, organic pollutant degradation-derived clean energy from the oxygen reduction reaction, and sensors. It is necessary to thoroughly examine the characteristics of carbon-based materials, including their synthesis and characterization, in order to comprehend the foundation for some of their properties and identify the most suitable applications. Carbon-based materials have been widely used as anode electrodes. A rod, plates, felt, cloth, mesh, brush, and graphitic carbon geometries like these have all been tested. Due to their uneven physical structure, some of these materials have a higher electrical resistance than is desirable, while others have a low specific surface area for biofilm growth or a high charge transfer resistance. To enhance carbon materials' performance, a number of enhancements have been proposed. Anode electrodes ought to be chemically inert and have a high electrical conductivity [4].

There are two types of surface modifications to materials: chemical and physical. A few examples of chemical alterations include covering with conducting polymers like polyaniline, increasing surface chemical groups like ammonium or quinines, and inserting electroactive substances like composites. By heating at high temperatures, porosity can be increased, and roughness can be increased by including nanotubes. Less frequently utilized carbon-based materials include anode electrodes made entirely of metallic materials, solid waste treated to prepare carbon material, and coated metals or polymers. Its performance is influenced by the bacterial community that is attached to the anode material, as well as the type and concentration of the carbon source [5].

Acknowledgement

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Conflict of Interest

None.

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Address for Correspondence: *Bronson Emers, Department of Photonics, University of Portland, Portland, USA; E-mail: bronsonemersbe@gmail.com*

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