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Synthesis, characterization and application of carbon dots

Roger M Leblanc and Shanhao Li
University of Miami, USA

Carbon dots (C-Dots) with diameter smaller than 10 nm have recently triggered great attention in the research of materials science and engineering due to their unique properties. Their potential applications have been explored in dielectric materials, optical sensing, and biomedical engineering. In this study, water soluble C-Dots were prepared from oxidizing carbon powders by a mixture of sulfuric acid and nitric acid. These C-Dots were characterized by spectroscopy (UV-Vis, fluorescence, FTIR, and XPS) and microscopy (AFM and TEM). C-Dots have been studied for dielectric properties and biomedical applications. Studies have showed that C-Dots based hybrids can be used as excellent electrode materials for capacitors. With C-Dots doping to a ferroelectric liquid crystal structure, remarkable enhancements were found in terms of switching response, spontaneous polarization and dielectric constant. Regarding the biomedical applications of C-Dots, our study showed that C-Dots could inhibit protein fibrillation, such as insulin and amyloid beta 40/42. Therefore, they could be potentially used as a drug to treat diseases associated with protein fibrillation. After conjugation with a plasma protein transferrin, these C-Dots could enter the central nervous system.

Biography

Roger Leblanc received a BSc Degree in Chemistry from Université Laval in 1964, followed by a PhD in Physical Chemistry in 1968. Then, he obtained a Post-doc position at the Royal Institution of Great Britain for two years before moving to the University of Québec, Trois-Rivières, Canada, where he spent 20+ years of studying photobiophysics. He moved his research to the University of Miami in 1994. He is a Professor and Chair of Chemistry Department at University of Miami. And his research interests are centered on biophotophysics, spectroscopy and surface chemistry and he has published 502 research articles related to these topics and has guided more than 100 PhD and MSc students.

rml@miami.edu

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