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Versatile Carbon Dots: Syntheses, Characterizations and Applications- Roger M. Leblanc, University of Miami, USA

Roger M. Leblanc
University of Miami, USA

Carbon dots (CDs) have recently triggered great attention in the research of material science and biomedical engineering due to their unique properties. They have been widely explored for applications in printing, photocatalysis, bioimaging, sensing, drug delivery, and nanomedicine. In this presentation, I will firstly introduce preparations of diverse CDs. Particularly, extensive structural characterizations have been performed to build comprehensive structural models for 3 distinct CD species derived from both top-down and bottom-up approaches.

Then, I will mainly focus on various applications of the CDs developed in our lab, glucose-based CDs could cross the blood-brain barrier (BBB) due to the presence of glucose transporter proteins on the BBB, carbon nitride dots conjugated with anti-cancer therapeutic drugs and a targeting molecule were capable of effective treatment against diffuse large B-cell lymphoma both in vitro and in vivo, metformin-derived CDs showed a unique nucleus targeting property, CDs have constantly shown the capability to inhibit the formation of amyloid precursor protein (APP), beta-amyloid (Aβ) and Aβ fibrils. CDs are promising nanomedicine and drug nanocarriers to treat Alzheimer's disease, photocatalytic degradation of diverse water pollution models revealed a remarkably enhanced photocatalytic activity of gel-like compared with most known CD species and comparability to graphitic carbon nitride (g-C3N4). In addition, the degradation rate constant was further improved by 1.4 times by embedding g-C3N4 in G-CDs; a pilot study showed a versatile nanocarrier could be assembled via the direct conjugation between distinct CDs to fulfill multitasks. Carbon specks (CDs) have arisen as most valuable blessings in nanotechnology in light of their supernatural properties and applications. Cds are regularly carbon nanoparticles, the majority of them with normal measurement under 10 nm. These materials are gotten from natural mixes and are steady in watery media which is incredibly huge as far as organic perspectives. Surface designing assumes a critical job for CDs in broadened applications like dangerous discovery, substance detecting, sanitation, bioimaging, drug conveyance, energy transformation, and photocatalysis. Photophysical and substance properties of CDs fluctuate drastically by tuning their shapes and estimates and furthermore by doping heteroatoms, for example, oxygen, nitrogen, phosphorus, sulfur, and boron. Also, photostability, high quantum yield, biocompatibility, low poisonousness, water dissolvability, great conductivity, and natural agreeableness of CDs get extra favorable circumstances over other all around perceived quantum spots (QDs) like grapheme quantum specks (GQDs), metal oxides (ZnO, TiO2), and inorganic QDs (ZnO-PbS, CdSe, CuInS/ZnS, and CuInS/ZnS). Indeed, noncarbon QDs are very little effortless in their field of uses contrast with CDs, in view of their genuine wellbeing and ecological issues. Discs can be integrated from both characteristic and manufactured natural forerunners. Manufactured systems that are regularly utilized in this worry are microwave illumination, aqueous therapies, ultrasonic light, laser removal, electrochemical, circular segment release, and pyrolysis. This short audit has been explicitly centered around the engineered techniques of CDs and their wide applications in unadulterated and applied sciences.