Luminescent Carbon Dots Derived from Biomass

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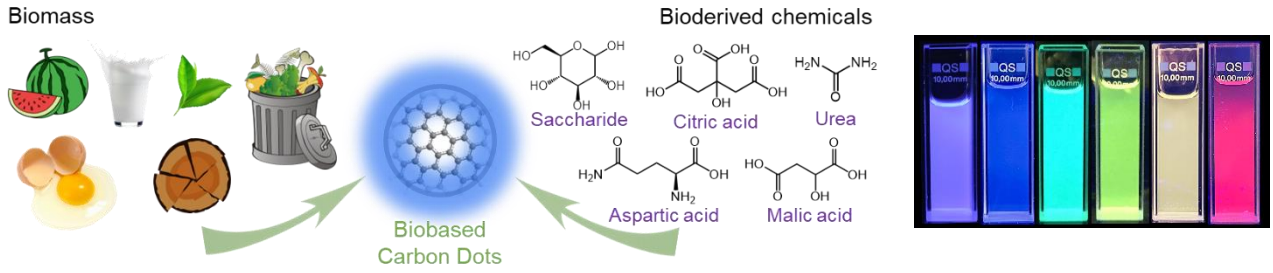
Luminescent materials utilized in current optoelectronic and biomedicine applications often necessitate critical raw materials, heavy metals, and petroleum-based chemicals for synthesis and purification, while their recycling remains a challenge. The increasing demand for these materials poses significant sustainability concerns linked to resource depletion and electronic waste.

Carbon dots (CDs) are emerging as a novel emissive nanomaterial with tunable emission, a high photoluminescence quantum yield, and robust photo-/chemical stability. Importantly, CDs can be synthesized from abundant and renewable biomass and bio-derived precursors, making them promising alternatives to conventional organic semiconductors.

Here we present the synthesis and characterization of highly luminescent CDs from both bio-derived small molecules and plant-based biomass, with particular focus on their sustainability.[1-8] we have also explored their application as emitters in organic light-emitting devices, random lasing devices, and biomedicine applications.[9, 10] Our results highlight the feasibility of developing bio-based CDs as sustainable luminescent materials for developing eco-friendly and greener applications in a broad range.



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