Synthesis and Properties of Novel Carbon Nanodots

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In recent years, the focus of nanoscience and nanotechnology has gradually shifted from the synthesis of individual components to their assembly into larger systems and materials. The precise organization of matter across multiple length scales is of particular interest due to its significant potential for enabling advanced functions and properties.

We have recently developed a simple, scalable, reliable, and cost-effective synthetic method for producing high-quality carbon nanodots (CNDs), using arginine and ethylenediamine as precursors [1,2]. The resulting material exhibits small size and high fluorescence quantum yields. Thanks to the presence of amino groups, CNDs can be easily post-functionalized. By introducing suitably designed functional units, the desired properties can be modulated in a controlled manner from the molecular to the nanoscale level. This approach allows for the synthesis of CNDs with tailored emission properties; for example, green- and white-emitting CNDs have been successfully prepared [3,4].

In addition, the electrochemical properties of specifically designed CNDs can be tuned, and chiral CNDs can be obtained from chirally stable starting materials [4,5]. Finally, CNDs have shown promising performance in organocatalysis, including applications in stereoselective synthesis.

In this talk, we will present our latest results in this rapidly evolving field.

References

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