

Red chiral carbon dots by isocyanate post-synthetic treatment

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Carbon dots are novel member of carbon nanomaterials family which have attracted a lot of attention as an eco-friendly and cost-efficient light-emitting nanoparticles. One of the perspective R&D directions for this type of nanoparticles is their functionalization for further applications varied from biology to photonics. Considering bio-applications, the nanoparticles should demonstrate their optical transitions in the red and near infrared spectral regions together with low toxicity and an opportunity to bond to bio-agents. Another important feature for bio-applications is chirality of nanoobjects which can be implemented in specific interactions, chiral separation, and analysis. In this study, we developed the post-synthetic treatment based on carbon dot's surface group bonding with an isocyanate group of chiral molecules. This method can be applied for different types of carbon dots, including red-emissive. The circular dichroism signal is observed at $n-\pi$ optical transitions in the carbon dots pointing on inducing the chirality by chiral molecule via covalent bond. These findings open an opportunity to design novel chiral emissive bio-compatible nanoparticles. This research was supported by the Russian Science Foundation (RSF22-13-00294).