

Dual Role of N-Doped Carbon Dots Based Transparent Polymer Film: A High-Efficiency Blue Light Converter and UV Screener

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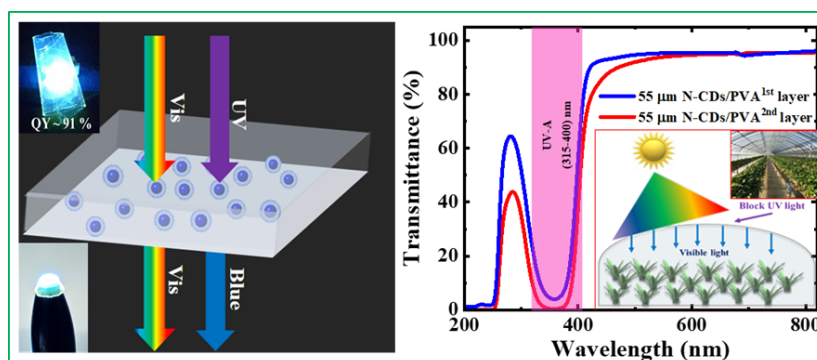
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N-doped carbon dots (N-CDs) is a unique metal free inexpensive material which have attracted extensive attention in optoelectronic devices, sensing, bio-imaging, security and photocatalysis due to their excellent advantages, such as high photoluminescence, high photo-stability and low toxicity. This can be a potential materials to replace traditional toxic metal based semiconductor quantum dots. We propose a novel transparent plastic material for high-performance UV-A (315-400 nm) shielding and blue light (440 nm) emission based on N-CDs. The luminescence is excitation independent, and the absorbance as well as the quantum yield are optimum at an excitation wavelength falling into UV-A region. The quantum yield becomes as high as 91% for N-CDs embedded in PVA matrix film, and the absorbance of the films is found to be proportional to thickness with no appreciable deterioration of quantum yield, which is highly beneficial for UV to blue light converting materials followed by UV-A blocking. The N-CDs colloids and films are fully bio-compatible as certified by the toxicity test and the film can also be very effective as low-cost transparent UV protection material for daily and agricultural use.



References

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