

## Carbon dots: building a robust optical shield for wood preservation

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**Abstract:** Wood is a sustainable building material that can help to achieve carbon neutralization but, because wood is easily damaged by ultraviolet (UV) light, it is important to protect wood from this harmful radiation. Here, we synthesized sustainable biomass-based carbon dots (Bio-CDs) using only microcrystalline cellulose, which was concentration-dependent and capable of absorbing short wavelength and converting it to long-wavelength light emission. Further, the Bio-CDs were mixed with poly (vinyl alcohol) (PVA) to produce robust optical shielding films (OSFs). The results showed that OSFs had good optical properties, which could effectively block UV and high-energy blue photons radiation by absorbing short wavelength light and converting it into longer wavelength (>450 nm) light. The extent of UV and high-energy blue photons blocking can be easily adjusted by varying the proportion of Bio-CDs in the film. The OSFs have good optical properties and have been successfully used to protect the wood from UV damage. This study, which uses an environmentally friendly and simple methodology, provides an example of sustainable research.

**Keywords:** Cellulose · Biomass-based carbon dots (Bio-CDs) · Concentration-dependent emission · Optical shielding film (OSF) · Wood protection