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Synthesis and characterization of carbon quantum dots from cucumber peel

In this work, a synthesis process was carried out to obtain fluorescent quantum dots from cucumber peel in order to produce white visible light.

The production of quantum dots consisted in a dehydration process followed by a milling procedure to obtain powders of the dehydrated peels. Subsequently, two thermal treatments were carried out at 100 °C and 200 °C to equal quantity of powders. Afterwards, three suspensions were prepared by pouring 0.2 g of powder into 30 ml of ethanol. The first solution was without thermal treatment, the second contained the biomass treated at 100 °C, and the third had the biomass treated at 200 °C.

Alternatively, mixes were prepared between the suspension without thermal treatment and the suspension treated at 200 °C in proportions of 25% - 75%, 50% - 50%, and 75% - 25%, with the aim of exploring their optical properties in search of white emission.

The powders were characterized by X-ray diffraction (XRD) and infrared spectroscopy (IR), while the optical properties of the suspensions were measured by ultraviolet-visible absorption spectroscopy (UV-Vis) and fluorescence spectroscopy. For the latter, a UV lamp at 370 nm and a UV laser at 405 nm were used as excitation sources.

It was found that the closest white emission was generated by the obtained from the powder treated at 200 °C when excited with the UV laser.

Keywords

carbon quantum dots, fluorescence, biomaterials, visible light emission, sustainable materials

Reference

Kang, C., Huang, Y., Yang, H., Yan, X. F., & Chen, Z. P. (2020). A review of carbon dots produced from biomass wastes. *Nanomaterials*, 10(11), 2316.

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