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9. simpozijum

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Perpetual struggle of doped carbon quantum dots surface chemistry with environmental contamination

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Industrialization today leads to a significant increase in the number of phenols, pesticides, paints, solvents and other organic pollutants with potentially carcinogenic effect in natural resources. One of the major problems is water pollution from the textile industry causing significant quantities of organic dyes released daily into the environment without special treatment [1]. The presented study reports an efficient and simple method for the green microwave-assisted production of doped carbon quantum dots (CQD) from glucose as carbon precursor (Figure 1) and their fight against water pollution.

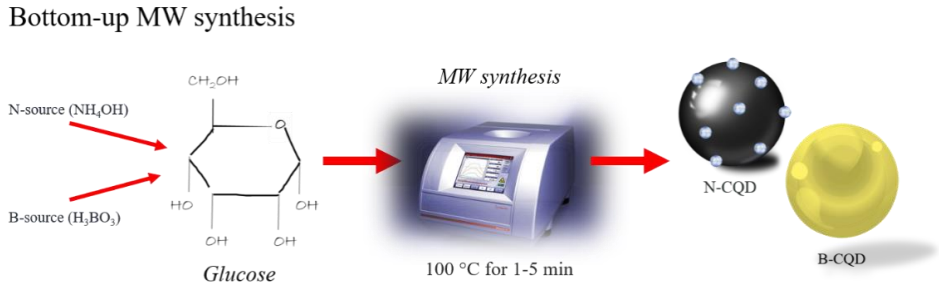

Figure 1. The illustration of the MW assisted synthesis of N-CQD and B-CQD from glucose.

The resulting N-CQD and B-CQD were negatively charged particles with a spherical shape. The good water dispersion properties of doped-CQDs came from oxygen-containing surface functional groups in the form of hydroxyl, carbonyl and carboxyl groups. The outcome of doped-CQDs surface chemistry towards a specific organic water contaminants removal efficiency was examined through the photocatalytic activity of selected photocatalysts.

A new type of carbon nanomaterials known as CQD, have exceptional physicochemical and optical features, tuneable photoluminescence and strong light absorption [2,3]. In addition to these characteristics, the variety of precursors and preparation techniques, along with the opportunity to modify the surface and dope the CQD to alter their properties, make them interesting candidates for a variety of applications [4–7].

Photocatalytic activity of N-CQD and B-CQD photocatalysts towards Rose Bengal (RB) removal efficiency was investigated under neutral pH, room temperature and constant pollutant (0.03 mM) and photocatalysts (0.2 mg/mL) concentration. Reaction in the dark

reaction conditions for 30 min (adsorption/desorption equilibrium) showed the better adsorption capacity for B-CQD photocatalyst while the N-CQD showed higher removal efficiency percentage towards decomposition of RB organic dye in a short time (Figure 2).

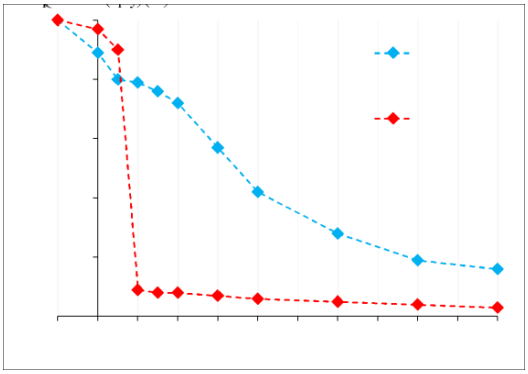

Figure 2. The removal efficiency percentage of RB organic dye in set time interval for B-CQD and N-CQD photocatalysts.

Both photocatalytic materials showed strong capacity for RB organic dye removal under UV light under 300 min with residual 16 % and 3 % of RB in the presence of B-CQD and N-CQD, respectively.

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