عنوان مقاله:

Synthesis, characterization and application of graphene oxide, graphene oxide quantum dots and graphene quantum dots in photoelectrochemical sensors

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خلاصه مقاله:

In this study, graphene oxide (GO), graphene oxide quantum dots (GOQD) and graphene quantum dots (GQD) were synthesized by Hummers, hydrothermal and the calcination in argon methods, respectively. Then the structure of the samples was characterized by X-ray diffraction, Fourier-transform infrared and Raman spectroscopies and their particle size distribution were investigated by dynamic light scattering. Afterward, the electrical and photoelectric properties of the samples were studied by electrical conductivity meter and diffuse reflectance and photoluminescence spectroscopies. Finally, the photoelectrochemical sensors were designed to detect dopamine (DA) based on GO, GOQD and GQD modified glassy carbon electrodes (GCE). The results showed that the sample of GO has graphene plates with widest particle size distribution (about ۱.۳ to ۵.۷ μm) and the highest electrical conductivity (۲۸۷.۹ μS/cm). On the other, the sample of GQD has narrowest particle size distribution (about ۵.۳ to ۱۲.۸ nm) and the lowest electrical conductivity (۱۶۵.۱ μS/cm). The samples of GOQD and GQD have light absorption throughout the range of visible wavelength and therefore have photoelectric behavior better than GO. As a result, in DA detection sensors, the photoresponse of the GCEs modified with GOQD and GQD is ۴ times higher than that of GO modified GCE.

کلمات کلیدی:

Graphene, Graphene quantum dots, Photoelectric property, Photo electrochemical sensor, Dopamine