

## عنوان مقاله:

Carbon Quantum Dots Extracted from Natural Lemon Juice: Efficient Material for Fluorescence and Antibacterial Applications

## محل انتشار:

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## نویسندگان:

مرآت کریمی - *Institute of Nanoscience and Nanotechnology, University of Kashan, Kashan, Iran*

احسان صادقی - *Institute of Nanoscience and Nanotechnology, University of Kashan, Kashan, Iran*

مصطفی زاهدی فر - *Department of Physics, University of Kashan, Kashan, Iran*

## خلاصه مقاله:

**Background & Objective:** In recent years, the proliferation of microbial organisms has increased alarmingly, and the overuse of various antibiotics against microorganisms has increased drug resistance. On the other hand, the need to reduce health costs, the production of antimicrobials with low costs, and the basic needs of today's human society have become. This led to a large-scale study of new drugs against microorganisms and the use of nanoparticles as antibacterial agents were considered. This study aimed to use biocompatible carbon quantum dots (CQDs) nanoparticles instead of antibiotics resistant to gram-positive and gram-negative microorganisms. **Materials & Methods:** Fluorescent carbon quantum dots were extracted from natural lemon juice using the hydrothermal approach. Analyzes of X-ray diffraction (XRD), Fourier transform infrared (FT-IR), ultraviolet-visible (UV-Vis), photoluminescence (PL), transmission electron microscope (TEM), and energy-dispersive spectrometer (EDS). CQDs were investigated on ten types of microorganisms by the microwell dilution method. In this study, the minimal inhibition concentrations (MIC) and the minimum bactericidal concentration (MBC) was determined. **Results:** Fluorescent CQDs less than 5 nm in size were fabricated and confirmed by structural and microscopic analysis. This test showed that four microorganisms *B. subtilis*, *E. coli*, *P. aeruginosa*, *S. pyogenes* and *C. albicans* were resistant to the antibiotic nystatin and showed the highest sensitivity to CQDs, the lowest MIC and MBC for CQDs are 250 µg/ml and 1000 µg/ml. **Conclusions:** In general, the results obtained from this study can claim that CQDs have antibacterial properties and can be introduced after further studies as candidates are used to treat or prevent a variety of infections caused by microorganisms.

## کلمات کلیدی:

Antibacterial activity, hydrothermal, carbon quantum dots, lemon juice

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