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## Synthesis of a Fluorescent Cation Surfactant Derived from Carbon Quantum Dots

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**Abstract:** Carbon quantum dots (CQDs) with easier preparation, lower manufacture cost and fluorescent feature caught extensive interests. Herein, a technique of synthesizing a novel cationic surfactant, derived from CQDs via chemical modification, was reported in this work in detail. Firstly, the CQDs were synthesized by aqueous solutions of citric acid and 3-(dimethylamino)-1-propylamine under hydrothermal condition at 180°C for 60 min. Then the CQDs reacted with excess 1-chlorododecane in alcohol medium via quaterisation for synthesizing the CQDs cationic surfactant. During the processes, the solvent alcohol as well as the excess of 3-(dimethylamino)-1-propylamine and 1-chlorododecane could be isolated efficiently and recycled. The experimental results showed that the CQDs cationic surfactant possessed versatility such as a good performance of reducing the surface tension of water, wonderful antibacterial effect on colibacillus at a lower concentration and a high fluorescent quantum yield.

Keywords: Carbon quantum dots; Chemical modification; Surfactant; Luminescence

## 1. Introduction

Carbon quantum dots (CQDs) or nano dots with convenient preparation, lower expenditure and fluorescent feature evoked extensive interests on their manufactures and applications. Usually, the raw materials of preparing CQDs were small molecules with multiply functional groups such as carboxyl [1], hydroxyl [2], amino groups [3], etc. Their crosslink under intensive conditions resulted in the production of CQDs with well hydrophily. Until today there were numerous reports about the preparing techniques and fluorescent applications in biological domains [3,4] on account of the lower toxicity [5]. The works about the chemical modification on CQDs and the successive application were rare [6]. In fact, the inherent oxygen- or nitrogen-

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