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Abstract

Carbon dots are interesting fluorescent nanoparticles to study due to their excellent optical properties and potential applications. However, further exciton study must be done to reveal luminescent origin. In this work, we present exciton dynamic study of carbon dots at room temperature. The carbon dots sample was synthesized from commercial sugar using simple microwave-assisted technique. Photoluminescence study was carefully done using various techniques, such as down and up conversion photoluminescence, time-resolved photoluminescence. Additional measurement such as absorbance spectroscopy and transmission electron microscope (TEM) were utilized. From TEM image, we found that carbon dots have lattice constant approximately 2.94 Angstrom. Furthermore, we can distinguish energy transition in carbon dots, such as core and surface energy, using absorbance and photoluminescence spectra. We found that surface energy become dominant as carbon dots concentration increase. Higher carbon dots concentration shift surface energy of carbon dots. However, this shift was not observed in up-conversion photoluminescence.

Keywords: Carbon dots, Photoluminescence, Surface energy

1. Introduction

2 Research on fluorescent nanoparticles has been rapidly grown due to
3 emerging new types of fluorescent nanoparticles, such as semiconductor quantum
4 dots, graphene dots, carbon dots, etc. Carbon dots, which were discovered
5 last decade, have shown good performances, so that they are potential

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