

## Luminescent carbon dot with dual wavelength depending on its concentration and excitation wavelength

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Carbon dot (CD), a carbon-based fluorescent nanomaterial, has attracted much attention for a promising phosphor in bio-imaging, opto-electronic device, and sensors due to its many advantages such as intense luminescence, low photo-bleaching, and low toxicity. However, the controversy in photoluminescence mechanism and the difficulty in realizing the red-emission have been regarded as the main limitations of CD. Controllability of the emission wavelength and long-wavelength emission with intense luminescence are necessary for the various applications of CD, especially in LED and bio-imaging. In this work, we synthesized the CD with dual emission center at red- and blue regions. Each emission center was located at 650 nm for red and 500 nm for blue region. We confirmed that the luminescence properties of the CD changes with the condition around the CD particles. The CD solution concentration and solvent species influenced on the intensities at each emission center. The information on luminescence properties and emission origin of the CD was analyzed using PL lifetime techniques and spectroscopic analysis.