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论文

脉冲激光制备发光碳纳米颗粒

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摘要:

利用毫秒脉冲激光辐照石墨悬浮液制备了超细碳纳米颗粒, 经过有机聚合物PEG 2000N的表面修饰, 碳纳米颗粒发出了较强的可见光, 并具有双光子激发的特征. 利用硫酸奎宁作参比, 测得碳纳米颗粒的荧光量子产率为6.3%. 石墨颗粒通过吸收激光能量快速升温并升华, 形成了大量的碳蒸气; 在周围液体介质的冷却下, 通过凝聚形成了碳纳米颗粒. 由于尺寸量子限制效应, 经过有机聚合物修饰后, 碳纳米颗粒表面产生了能量势阱, 导致了碳纳米颗粒的可见光发射. 发光的碳纳米颗粒具有无毒、化学惰性和良好的生物相容性, 在生物医药领域具有重要的应用价值.

关键词: 碳纳米颗粒; 发光; 脉冲激光

Preparation of Fluorescent Carbon Nanoparticles by Pulsed Laser

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Abstract:

Ultrafine carbon nanoparticles were prepared by irradiating graphite suspension employing millise-cond pulsed laser. Carbon nanoparticles emitted strong visible light after surface modification using PEG 2000. The characteristic of two-photon fluorescence was detected in the experiment. Fluorescence quantum yield of carbon nanoaprticles was 6.3% employing quinine sulfate in 0.1 mol/L H_2SO_4 as the standard reference sample. Graphite particles were heated up and sublimed by laser energy absorption; therefore, a large amount of carbon vapors were produced. After pulse duration, the carbon vapors cooled quickly under the liquid medium and formed carbon nanoparticles by condensation. Surface energy traps were created on the carbon nanoparticles after surface modification and resulted in the visible light emission due to the quantum confinement effects. Fluorescent carbon nanoparticles show high potential on the application of biology labeling and life science due to many advantages such as low cytotoxicity, biocompatibility, and chemically inert.

Keywords: Carbon nanoparticle; Fluorescence; Pulsed laser

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