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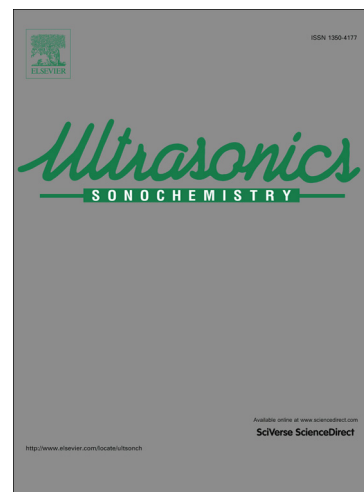
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STM-electroluminescence from Clustered C₃N₄ Nanodomains Synthesized via Green Chemistry Process.

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Abstract

A Scanning tunneling microscopy/Spectroscopy (STM/STS) and synchrotron x-ray diffraction study on clustered C₃N₄ nanoparticles (nanoflakes) is conducted on green-chemistry synthesized samples obtained from chitosan through high power sonication. Morphological aspects and the electronic characteristics are investigated. The observed bandgap of the nanoflakes reveals the presence of different phases in the material. Combining STM morphology, STS spectra and X-ray diffraction (XRD) results one finds that the most abundant phase is graphitic C₃N₄. A high density of defects is inferred from the XRD measurements. Additionally, STM-electroluminescence (STMEL) is detected in C₃N₄ nanoflakes deposited on a gold substrate. The tunneling current creates photons that are three times more energetic than the tunneling electrons of the STM sample. We ponder about the two most probable models to explain the observed photon emission energy: either a nonlinear optical phenomenon or a localized state emission.

Keywords: STM-electroluminescence; graphitic carbon nitride; green process; X-ray diffraction; STM/STS; sonication.

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