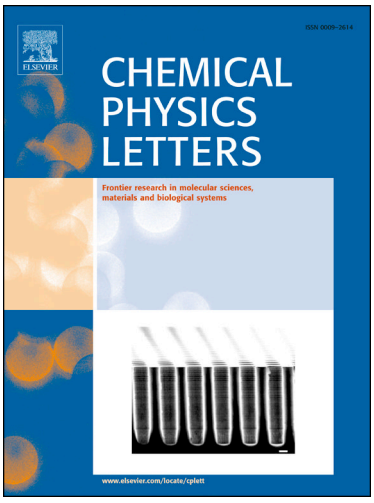

Research paper

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Ultrafast Nonlinear Optical Studies of Equiaxed $CuNbO_3$ Microstructures

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Abstract

Diverse microstructures of monoclinic copper niobate (m-$CuNbO_3$) were synthesized by solid-state reaction (900 ^oC, 3-12 hours). FESEM data demonstrated that agglomerated clusters grew as elongated grains which migrated to form web-shaped equiaxed structure and dissected to form individual equiaxed microstructure. With femtosecond laser excitation (800 nm, 150 fs), open aperture data Z-scan revealed the presence of two-photon absorption. The nonlinear refractive index (n_2) toggled between positive and negative nonlinearity for different microstructures. Web-shaped equiaxed structure kindled both the nonlinear absorption ($\beta_{eff}=2.0\times10^{-12}$ m/W), nonlinear refraction ($n_2=3.16\times10^{-17}$ m^2/W) and a strong optical limiting action (onset limiting threshold of 22.24 μJ/cm^2).

Keywords: Copper niobate; Morphological studies; femtosecond; Z-scan; optical limiting

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