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Ultrafast Nonlinear Optical Studies of Equiaxed CuNbO3 Microstructures

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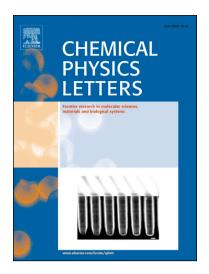
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Ultrafast Nonlinear Optical Studies of Equiaxed CuNbO₃

Microstructures

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Abstract

Diverse microstructures of monoclinic copper niobate (m-CuNbO₃) were synthesized by solid-state reaction (900 °C, 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 (n₂) toggled between positive and negative nonlinearity for different microstructures. Web-shaped equiaxed structure kindled both the nonlinear absorption (β_{eff} =2.0×10⁻¹² m/W), nonlinear refraction (n₂=3.16×10⁻¹⁷ m²/W) and a strong optical limiting action (onset limiting threshold of 22.24 μ J/cm²).

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

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