

Abstract Submitted
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Direct mapping of the exciton-polariton dispersion in tree-like ZnO micro-structures¹ XIANGSHUN LU, Dept. of Physics, Univ. of Arkansas, HUAJUN ZHOU, Z. RYAN TIAN, Dept. of Chemistry and Biochemistry, MIN XIAO, Dept. of Physics, Univ. of Arkansas — We report a direct observation of branches of the exciton polaritons in tree-like ZnO micro-structures using second-harmonic generation (SHG) spectroscopy. Within the tunable range of a mode-locked Ti:Sapphire laser with pulse width of 100 femto-second, we are able to tune the second harmonic energy of the incident laser across the A, B and C excitons of ZnO. Under the resonant enhancement of the strong coupling between photons and excitons, we obtain for the first time the direct mapping of the branches of exciton-polariton dispersion at the room as well as liquid nitrogen temperatures. We also observed strong modulation of the polariton spectra by the whispering-gallery modes (WGMs) formed inside the tree-like micro-structure. The disappearance of the SHG in tree-like ZnO near/above the energy of the excitonic band gap indicates the much higher efficiency of energy conversion, comparing to the simple ZnO rod, and reveal the practical and important applications of the tree-like micro-structures in solar cell.

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