the two emission channels. This analysis allows us to unambiguously assign the blue band as resonantly enhanced coherent second harmonic emission close to the band gap of ZnO. The blue-green emission band, displaying detection-wavelength independent fringes, results from multiphoton-absorption-induced incoherent spontaneous emission from below bandgap defect states. Our results show that IFRAC microscopy is a new and elegant way to fully characterize the coherence properties of the optical emission from nanostructures. With its high time resolution of a few fs only, it can directly probe the dynamics of coherent optical polarizations in nanostructures in the time domain. Its high spatial resolution makes it interesting for studying the nonlinear optical properties of single nanostructure and/or for coherent nonlinear optical microscopy.

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