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Non-linear optical nano-structured probe for photonic force microscopy ASWINI KANNEGANTI, HARSHIT VALLABH, NINAD INGLE, UT Arlington, XIAO ZHANG, JING LI, Rutgers Univ., SAMARENDRA MOHANTY, UT Arlington — Use of second-harmonic (SH) optical probes for imaging of microscopic samples has distinct advantages over fluorescence, which suffers from photobleaching. Further, SH nanoparticles can be optically trapped for probing interaction forces and even for topographic imaging of nanostructures. Here, we report SH generation in $ZnS(pda)_{1/2}$ (pda = propanediamine), a new class of nanostructured crystals. $ZnS(pda)_{1/2}$ is an isostructure of $ZnTe(pda)_{1/2}$ as confirmed by PXRD pattern. The SHG imaging of the nanocrystals was carried out by an ultrafast ($\sim$100fs) Ti: Sapphire laser beam (wavelength: 960 nm; repetition rate: 80 MHz) focused to a diffraction limited spot by use of a 100X microscope objective leading to very high peak power density. Dependence of SHG intensity as a function of laser power and axial position of the nanoparticle in the focused laser microbeam was quantitated for the purpose of photonic force microscopy. The suspended $ZnS(pda)_{1/2}$ nanocrystals could be trapped using the near-IR Ti: Sapphire laser microbeam. The SHG intensity was found to fall very rapidly as the nanocrystal is displaced from the focused spot, which led to highly sensitive height measurements. Non-linear optical characterization of the $ZnS(pda)_{1/2}$ nanocrystals and its use in photonic force microscopic imaging will be presented.

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