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Non-linear Optical Properties of Semiconductor Nanoparticle-Doped Glass Microspheres ANURANJITA TEWARY, Geballe Laboratory for Advanced Materials, Stanford University, APRIL MONTOYA VAVERKA, University of California, Davis, RISBUD SUBHASH, University of California, Davis, MARK BRONGERSMA, Geballe Laboratory for Advanced Materials, Stanford University — Microspheres were fabricated by heating with a CO_2 laser ($\lambda = 10.6$ μm) the sharp tip of a fiber pulled from CdTe-doped or Silicon-doped borosilicate glass. Nanoparticles were formed in the microspheres during the few seconds that it took for the microsphere to form under CO_2-laser irradiation. We have fabricated microspheres ranging in diameter from 10 μm to 300 μm. These microspheres contain nanoparticles ranging in diameter from 5 nm to 10 nm, as indicated by TEM. We have resonantly coupled light into the whispering gallery modes (WGM) of the microspheres using a tapered-fiber coupler. We have measured high optical quality factors (Q) of $2X10^4$ for a 30 μm diameter CdTe nanoparticle-doped microsphere and $5X10^4$ for a 300 μm diameter silicon nanoparticle-doped microsphere. We will present our results on a number of non-linear optical studies conducted on these microspheres and discuss the implications of these results towards making active optical devices.

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