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Stimulated Raman Scattering from Short GaP Nanowires[1] JIAN WU, AWNISH GUPTA, PETER EKLUND, DEPARTMENT OF PHYSICS TEAM, DEPARTMENT OF MATERIAL SCIENCE AND ENGINEERING TEAM — We report an interesting discovery of very strong non-linear optical behavior in short GaP nanowire segments. They were formed by cutting a $\sim$40 μm long and 210 nm diameter GaP nanowire into various lengths using a focused ion beam. This approach allows us to study length as the variable in the non-linear behavior. A giant nonlinear Raman amplification has been observed in these segments with length L$<$ 1.2μm for the first time. The nonlinear Raman effect has been demonstrated to increase as the lengths of nanowire segments decreases. As far as the relationship between Raman scattering intensity and laser pump power, we also observed that there exists a threshold pump laser power which separates the linear and super-linear regions. The effective pump power can be as low as 200 μW that is 1000 times smaller than bulk values. We attribute this giant nonlinear Raman effect to stimulated Raman scattering (SRS) from nanocavities formed by these short GaP nanowires. The quality factor Q of these short segments was estimated to be 10^3 to 10^4. We believe our observation suggests the possibility to make a new type of SRS semiconductor laser.

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