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Cubic Nonlinearity of WS_2 Nanoflakes TIKARAM NEUPANE, DULITHA JAYAKODIGE, BAGHER TABIBI, FELIX JAETAE SEO, Hampton University, HAMPTON UNIVERSITY TEAM — The cubic nonlinearity of tungsten disulfide atomic layers is of great interest for optical power limiting and saturable Q-switching. The nonlinear optical properties of tungsten disulfide nanoflakes in aqueous solution was characterized with Z-scan technique with resonant at 532 nm with 6 ns pulse width and 10 Hz repetition rate. The absorption spectrum of WS_2 nanoflake mixtures of one to four atomic layers in aqueous solution shows the characteristic A, B, and C peaks. The A and B absorption bands are due to the large band spitting of conduction band with strong coupling between electron spin and d-electron orbital coupling, and the C band is due to the band nesting by the singularity of joint density of state. The nonlinear absorption and nonlinear refraction coefficients of WS_2 nanoflakes were estimated to be ˜6.2 x 10^4 cm/GW with open Z-scan, and ˜-0.9 x 10^{-10} cm^2/W with closed Z-scan. Acknowledgment: This work is supported by ARO W911NF-15-1-0535, NSF HRD-1137747, and NASA NNX15AQ03A.

Felix Jaetae Seo
Hampton University

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