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Two-dimensional (2D) semiconductor: Probing by femtosecond broadband continuum second harmonic generation (SHG) measurement
MOHAMMAD MOKIM, FERUZ GANIKHANOV, Univ of Rhode Island — After the remarkable success of graphene, two-dimensional (2D) semiconductors have recently become the focus of fundamental research due to their novel electronic and optical properties, making for very promising applications in nano- and optoelectronic devices. We demonstrate an effective microspectroscopy technique by tracing the dispersion of second order nonlinear susceptibility $\chi^{(2)}$ to characterize the monolayer tungsten diselenide (WSe_2) within the photon energy range of 2.4-3.2 eV. We then retrieve, with reasonable precision, the fundamental bandgap and exciton binding energy of this semiconductor. To perform the experiment, ultra-broadband continuum pulses served as the fundamental beam while its second harmonic spectrum in visible and ultraviolet (UV) was detected and analyzed with better than 0.3 nm spectral resolution (<2 meV). In this presentation, I will discuss our recently obtained experimental results that can be crucial to refining the theoretical calculations.

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