Abstract Submitted
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Tunable second harmonic generation of monolayer MoS_2 by Se doping[1] C. T. LE, Univ of Ulsan, D. J. CLARK, Binghamton University, V. SENTHILKUMAR, Univ of Ulsan, J. I. JANG, Binghamton University, H.-Y. CHO, Y. S. KIM, Univ of Ulsan, BINGHAMTON UNIVERSITY COLLABORATION — As a transition metal dichalcogenides whose bandgap becomes direct with inversion symmetry breaking in the monolayer limit, MoS_2 has been getting ample attention as next-generation nonlinear optic material for its strong optical nonlinear properties. In this study, we demonstrate the wavelength second harmonic generation tunability of monolayer Mo(S, Se)$_2$. Employing the two-zone furnaces system, we selenized as-grown monolayer MoS_2 at different temperature. X-ray photoluminescence spectroscopy was used to confirm the chemical composition of selenized film. Photoluminescence spectra shows the red shift in optical bandgap from 1.83 to 1.53 eV as a function of concentration Se replacing S. Second harmonic generation characteristics were measured in reflection geometry using *p*s pulse from Nd:YAG laser. Applying the previous bulk model, we calculated that the maximum value of $\chi^{(2)}$ varied from ˜40 pm/V for pure MoS_2 to ˜100 pm/V for pure $MoSe_2$. We believe that our findings along with the ability to stack different 2D materials will create stacked 2D heterostructure with high $\chi^{(2)}$ over a wide range of wavelength from visible to NIR.

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