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**Raman signatures of stacking order in 2D Gallium Selenide** SOO YEON LIM, JAE-UNG LEE, Sogang University, JUNG HWA KIM, UNIST, THI THANH HUONG NGUYEN, University of Ulsan, ZONGHOON LEE, UNIST, SUNGLAE CHO, University of Ulsan, HYEONSIK CHEONG, Sogang University
— Gallium selenide (GaSe) is a van der Waals layered semiconductor with a 2.1-eV bandgap consisting of post-transition metal gallium (Ga) and chalcogen selenium (Se). GaSe can be used in photodevices since GaSe has high photoresponsivity and external quantum efficiency. For example, GaSe-nanosheet-based photodetector has current responsivity of 2.8 A/W while single layer MoS2-based one has only 7.510-3 A/W. [1] We investigated more than 40 different GaSe samples by polarized Raman spectroscopy from monolayer to bulk. The $A^1_{1g}$ mode blueshifts with increasing layer number while other peaks do not change much. We also observed low frequency shear modes coming from inter-layer vibrations in the range of 5-25 $cm^{-1}$. We found that there are different types of low-frequency Raman spectra even in the same-thickness flakes, which means that GaSe exists with different stacking order domains. In 3-layer GaSe, we found four-types of low-frequency Raman spectra which correspond to different stacking orders. [2] [1] PingAn Hu et al., ACS nano, 6, 5988 (2012) [2] Jae-Ung Lee et al., ACS nano, 10, 1948 (2016)

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