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Gallium-monochalcogenides mechanically exfoliated at temperatures above room temperature JOSE FONSECA VEGA, HUI FANG, ALI JAVEY, OSCAR DUBON, University of California - Berkeley — In recent years, there has been an increased interest toward layered 2D materials beyond graphene. Among these III-VI metal-chalcogenide layered semiconductors are interesting materials for 2D applications as the digitally controlled crystal thickness (by the number of layers) opens a new degree of freedom to tailor electronic properties. In this work, thin layers of GaSe and GaTe were obtained via micromechanical exfoliation and transferred onto SiO2/Si substrates at temperatures ranging from room temperature to 75 C. Exfoliation above room temperature showed a dramatic increase in yield and mean surface area for the exfoliated single-crystalline flakes, 75 C and 50 C being the optimum conditions for GaSe and GaTe, respectively. Few-layer flakes were observed through optical microscopy. It was found that GaTe offered an additional challenge for exfoliation; this was attributed to its monoclinic crystal structure, contrasting GaSe's hexagonal structure. Atomic force microscopy thickness measurements determined the amount of layers in the exfoliated flakes. Micro-Raman and photoluminescence spectroscopy reveal an evolution in properties in these materials as a function of thickness. Results from measurements of field-effect transistors will be presented.

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