High-Frequency 2D Gallium-Telluride Resonators

Gallium Telluride (GaTe) is a two-dimensional (2D) material, which exhibits a direct bandgap when realized in a multilayer form and thus holds a great potential for integration as a core element in optomechanical devices. In the present study, we demonstrate the mechanical and electromechanical characteristics of suspended 2D GaTe nanodrums. We used atomic force microscopy to extract the Young's Modulus of the 2D GaTe (38 GPa) and estimated their resonance frequencies. Subjecting these nanodrums to a time-dependent electrostatic actuation force revealed fundamental resonance frequencies in the range of 10-25 MHz, which closely match predicted values. Therefore, this study opens the door for creating a new generation of 2D GaTe-based nano-electromechanical (NEMS) devices with a direct bandgap vibrating element.