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Simulating MEMS Chevron Actuator for Strain Engineering 2D Materials[1] MOUNIKA VUTUKURU, JASON CHRISTOPHER, DAVID BISHOP, ANNA SWAN, Boston Univ — 2D materials pose an exciting paradigm shift in the world of electronics. These crystalline materials have demonstrated high electric and thermal conductivities and tensile strength, showing great potential as the new building blocks of basic electronic circuits. However, strain engineering 2D materials for novel devices remains a difficult experimental feat. We propose the integration of 2D materials with MEMS devices to investigate the strain dependence on material properties such as electrical and thermal conductivity, refractive index, mechanical elasticity, and band gap. MEMS Chevron actuators, provides the most accessible framework to study strain in 2D materials due to their high output force displacements for low input power. Here, we simulate Chevron actuators on COMSOL to optimize actuator design parameters and accurately capture the behavior of the devices while under the external force of a 2D material. Through stationary state analysis, we analyze the response of the device through IV characteristics, displacement and temperature curves. We conclude that the simulation precisely models the real-world device through experimental confirmation, proving that the integration of 2D materials with MEMS is a viable option for constructing novel strain engineered devices.

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