

## Abstract

The background and intent of the study is to gain insight on 2D materials with a more specific selectivity range for gas detection. The current technology being utilized has trouble with sensitivity with trying to detect gasses like methane and CO<sub>2</sub> in unforgiving environments. The emergence of graphene and other 2D materials has been discovered to have exceptional sensitivity to gas, as well as possessing a higher energy efficiency in comparison to the current equipment in use. The method of fabricating each 2D sensor material is to first grow each of the 2D materials utilizing Chemical Vapor Deposition (CVD). Chemical vapor deposition is a method involving a high temperature vacuum environment in which chemical vapor is deposited onto a substrate. After each 2D material is grown, the next step is to implant each material onto silicon wafers. After implantation, electrodes will be attached to finish the fabrication of the Field Effect Transistor (FET), completing the fabrication process of a 2D FET. Once the FET's are fabricated, they will be placed in a testing chamber and methane at different concentrations will be injected into the chamber to test the sensitivity of each material utilizing LabView Software. The relevance to NASA's strategic research plan is that future utilization of 2D FET technology for use in gas sensing and possibly other purposes can make space exploration more energy efficient, as well as better aid the search for life on other planets. Though the fabrication of the transistors has not been completed yet, Molybdenum Disulfide (MoS<sub>2</sub>) is hypothesized to have the best results because of the enhanced semiconductive/ electronic properties in comparison to graphene and the other 2D materials