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Fabrication of CDMS Dark Matter Detector using Bi-layer Lift-off Technique SHUBHAM VERMA, RUPAK MAHAPATRA, Texas A&M University — Finding out the nature of Dark Matter is one of the biggest unanswered questions in physics today. One of the various methods for Dark Matter detection is direct detection in which the interaction between Dark Matter and the normal matter is explored. The extremely weak nature of Dark Matter particle makes direct detection very challenging thereby demanding highly sensitive detectors. Super CDMS experiment uses cryogenic superconducting Ge and Si as target materials with Transition Edge Sensors (TES) for direct Dark Matter detection. The classic fabrication technique of CDMS detectors uses chemical etching of Aluminum and Tungsten thin films deposited on Si and Ge crystals to pattern TESs on the detectors. We have explored another technique called bi-layer lift-off process, which does not use any chemical etchants and thus, allows us to explore other target materials like Sapphire which seem to have been affected by using chemical etchants with the older technique. Use of Sapphire as target material results in only nuclear recoil, which can help us to improve the detector sensitivity for better detection of Dark Matter. The lift-off technique can also help in improving the phonon collection efficiency from crystal to aluminum thereby improving the sensitivity of these detectors.

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