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Towards FIB patterning of commercial SiN membranes for sensitive magneto-calorimetry KURTIS WICKEY, Department of Physics, The Ohio State University, THOMAS KENT, ROBERTO MYERS, Department of Material Science and Engineering, The Ohio State University, JOSEPH HEREMANS, Department of Mechanical Engineering, The Ohio State University, EZEKIEL JOHNSTON-HALPERIN, Department of Physics, The Ohio State University — Investigating magnetocaloric effects in thin films, spin-thermal coupling, and the heat capacity of 2D materials such as graphene, germanene, and MoS_2 requires small (hundreds of microns and less) thermally isolated platforms with sensitivity to comparably small heat capacities. Previously, calorimeters fabricated on amorphous SiNx membranes have been used due to their low thermal conductivity and compatibility with standard fabrication techniques. Here, we use a focused ion beam (FIB) to remove large portions of commercial SiNx membranes, leaving a platform that is thermally isolated from the Si frame by narrow supporting legs. This approach allows the fabrication of the calorimeter around existing samples such as flakes of MoS_2, pre-patterned mesas of magnetic thin films, etc. The thermal isolation of the platform ensures uniform temperature without the use of the thermally conducting layer present in unpatterned membrane calorimeters, further improving the sensitivity of our calorimeters. We will discuss our progress towards realizing these calorimeters.

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