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Coupling ZnSe band spin states and 4H-SiC defect spin states across their interface[1] ANDREW L. YEATS, Institute for Molecular Engineering, University of Chicago, Chicago, IL 60637, ANTHONY RICHARDELLA, NITIN SAMARTH, Center for Nanoscale Science & Dept. of Physics, Penn State University, University Park, PA 16802, DAVID D. AWSCHALOM, Institute for Molecular Engineering, University of Chicago, Chicago, IL 60637 — Point defects in silicon carbide (SiC) have emerged as a promising platform for quantum information processing and nanoscale sensing in a technologically-mature semiconductor. ZnSe is a promising candidate for semiconductor spintronic applications and has selection rules compatible with optical orientation of conduction electron spins. We combine pump-probe optical measurements with pulsed optically detected magnetic resonance (ODMR) sequences to investigate coupling between SiC defect spins and ZnSe conduction electron spins in ZnSe/4H-SiC heterostructures. Preparation of these structures by molecular beam epitaxy (MBE) and ion implantation is discussed in terms of interface optimization.

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