Abstract

High-precision resistance noise measurements indicate that the epitaxial CoSi2/Si heterostructures at 150 K and 2 K (slightly above its superconducting transition temperature Tc of 1.54 K) exhibit an unusually low 1/f noise level in the low frequency range. This corresponds to an upper limit of Hooge constant \( \gamma \leq 3 \times 10^{-6} \), about 100 times lower than that of single-crystalline aluminum films on SiO2. Supported by high-resolution cross-sectional transmission electron microscopy studies, our analysis reveals that the 1/f noise is dominated by excess interfacial Si atoms and their dimer reconstruction induced fluctuators. Unbonded orbitals (i.e., dangling bonds) on excess Si atoms are intrinsically rare at the epitaxial CoSi2/Si(100) interface, giving limited trapping-detrapping centers for localized charges. With its excellent normal-state properties, CoSi2 has been used in Si-based integrated circuits for decades. The intrinsically low noise properties could have high potential for developing quiet qubits and scalable superconducting circuits for future quantum computing.