Biography: Shao-Pin Chiu was born in Taiwan in 1976. In 2000 he graduated from the institute of physics (IOP) in National Chiao Tung University (NCTU) in Taiwan. After working in the Hsinchu science-based park for four years, he started his doctoral studies in 2004 at NCTU, where he was awarded his Ph.D. in 2010 for the work on electrical transport in single nanowire devices. After the post-doctoral studies on nanowire devices in IOP NCTU, he joined the NCTU-RIKEN Joint Research Laboratory in the end of 2012 and expanded his research field to topological insulators and superconducting materials. Now his main interest is to study the exotic superconducting property from the differential conductance of normal metal-superconductor (N-S) junctions.

Representative publications.

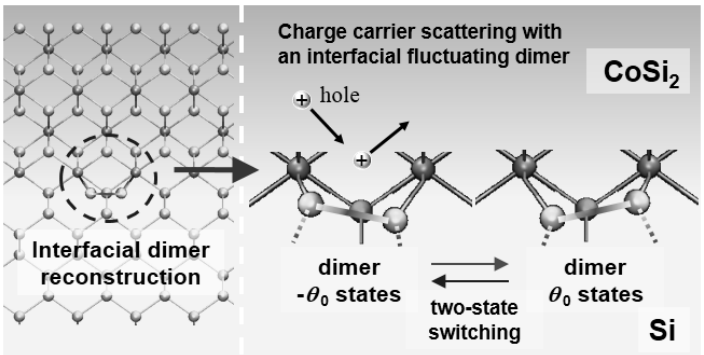
1. Phuoc Huu Le, **Shao-Pin Chiu**, Sheng-Rui Jian, Chih Wei Luo, Jiunn-Yuan Lin, Juhn-Jong Lin, Kaung Hsiung Wu, M Gospodinov, *Nanomechanical, structural, and transport properties of Bi3Se2Te thin films.* Journal of Alloys and Compounds **679**, 350-357 (2016).
2. **S. P. Chiu**, Jia Grace Lu, and J. J. Lin, *Quantum-interference transport through surface layers of indium-doped ZnO nanowires.* Nanotechnology **24**, 245203 (2013).
3. **S. P. Chiu** and J. J. Lin, *Weak antilocalization in topological insulator Bi2Te3 microfakes.* Phys. Rev. B **87**, 035122 (2013).
4. Y. W. Hsu, **S. P. Chiu**, A. S. Lien, and J. J. Lin, *Long electron dephasing length and disorder-induced spin-orbit coupling in indium tin oxide nanowires.* Phys. Rev. B **82**, 195429 (2010)
5. **S. P. Chiu**, Y. H. Lin and J. J. Lin, *Electrical conduction mechanisms in natively doped ZnO nanowires.* Nanotechnology **20**, 015203 (2009).

The Low Frequency Noise and Magnetotransport Properties of Superconducting Cobalt Diciliside Thin Films on Silicon

Shao-Pin Chiu

NCTU-RIKEN Joint Research Laboratory, Institute of Physics, National Chiao Tung University, Hsinchu 300, Taiwan. E-mail: fluentbb@gmail.com

High-precision resistance noise measurements indicate that the epitaxial $CoSi_2$/Si heterostructures at 150 K and 2 K (slightly above its superconducting transition temperature T_c 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 $\gamma \leq 3\times10^{-6}$, about 100 times lower than that of single-crystalline aluminum films on SiO_2. 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 $CoSi_2$/Si(100) interface, giving limited trapping-detrapping centers for localized charges. With its excellent normal-state properties, $CoSi_2$ has been used in silicon-based integrated circuits for decades. The intrinsically low noise properties discovered in this work could open up a promising avenue for developing quiet qubits and scalable superconducting circuits for future quantum computing.



The origin of strong spin-orbit coupling of $CoSi_2$ thin film on Si is an unsolved puzzle. From magneto-transport measurement we can extract spin-orbit scattering time τ_{so} and study what kind of dependence between τ_{so} and the elastic mean free path τ_e of charge carriers. With this information (τ_{so} vs. τ_e), we can understand the deep mechanism of spin-orbit coupling of a $CoSi_2$/Si heterostructure.

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