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(57) Abstract :

A method to fabricate a Quantum-spin topological semiconductor (QSTS) node involves combining 101 a topological insulator with a magnetic dopant to achieve intrinsic magnetism and spin-polarized edge currents, stacking 102 two-dimensional topological layers of the hybrid topological-magnetic alloy with skyrmion-hosting magnetic layers to stabilize quantum states and enhance spin-orbit coupling at room temperature, sculpting 103 the 2D layers into three-dimensional (3D) nanostructures through atomic-lithography to extend topological protection across multiple dimensions to minimize defects and decoherence and enhance spin-polarized electrons, coating 104 the 3D nanostructures with superconductors to induce proximity effects that enable manipulation of robust quantum modes for fault-tolerant computing, and embedding 105 plasmonic elements in superconductor-coated 3D nanostructures to facilitate ultrafast, energy-efficient spin switching using the inverse spin Hall effect.

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