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(54) **SYSTEMS AND METHODS FOR FABRICATION OF SUPERCONDUCTING INTEGRATED CIRCUITS WITH IMPROVED COHERENCE**

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(57) **ABSTRACT**

A method of fabrication of a superconducting device includes forming a first portion of the superconducting device on a first chip, a second portion of the superconducting device on a second chip, and bonding the first chip to the second chip, arranged in a flip-chip configuration. The first portion of the superconducting device on the first chip includes a dissipative portion of the superconducting device. A multi-layer superconducting integrated circuit is implemented so that noise-susceptible superconducting devices are positioned in wiring layers formed from a low-noise superconductive material and that underlie wiring layers that are formed from a different superconductive material. A superconducting integrated circuit has a first stack with a first superconducting wiring layer formed from a first high kinetic inductance material and a second superconducting wiring layer communicatively coupled to the first superconducting wiring layer to form a first control circuit, a second stack comprising a third superconducting wiring layer formed from a second high kinetic inductance material and a fourth superconducting wiring layer communicatively coupled the third superconducting wiring layer to form a second control circuit. The superconducting integrated circuit also has a third stack with a controllable device, and at least one of the first control circuit and the second control circuit is communicatively coupled to the controllable device.