

High Temperature Superconducting Single Flux Quantum T Flip-Flop

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We designed a high temperature superconducting single flux quantum(SFQ) T flip-flop(TFF) circuit using Xic and Wrspace. According to the optimized circuit parameters, we fabricated the TFF circuit with $Y_1Ba_2Cu_3O_{7-x}$ (YBCO) interface-controlled Josephson junctions. The whole circuit was comprised of five epitaxial layers including YBCO ground plane. The interface-controlled Josephson junction was fabricated with natural junction barrier that was formed by interface-treatment process. Before the operation of T flip-flop, we investigated each YBCO layer quality, all junction characteristics, and via hole characteristics. We discussed some circuit parameters, especially in terms of junction and via hole characteristics, and fabrication issues for good circuit operation.

keywords : SFQ, T flip-flop, $Y_1Ba_2Cu_3O_{7-x}$, interface-controlled, Josephson junction