

Nanosecond switching of gate controlled supercurrent in an Al/InAs nanowire

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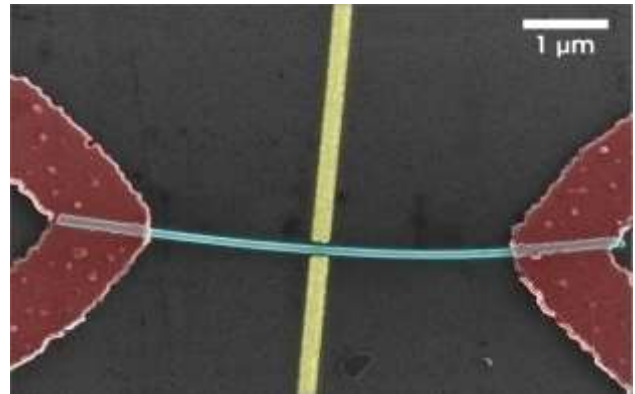


Figure 1: SEM image of the gated superconducting device.

Gate controlled supercurrent (GCS) has recently attracted much attention[1][2][3], as it is essential for many potential electronic applications, such as superconducting switches, and even logic gates. We show that by embedding the superconductor to be gated in an appropriate circuit, we can induce the supra to normal switching within nanoseconds using a gate electrode. We model the whole circuit to demonstrate how displacement currents contribute to the fast switching, and show experimental evidence of such displacement currents in our sample.

References

- [1] J. Basset, *et. al.* "Gate-assisted phase fluctuations in all-metallic Josephson junctions". *Phys. Rev. Res.* 3 (2021)
- [2] T. Elalaily *et. al.* "Signatures of Gate-Driven Out-of-Equilibrium Superconductivity in Ta/InAs Nanowires". *ACS Nano* 17.6 (2023)
- [3] T. Elalaily *et. al.* "Gate-Controlled Supercurrent in Epitaxial Al/InAs Nanowires". *Nano Letters* 21.22 (2021)

Figures