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**Investigation of semiconductor nanowires with shadow-evaporated epitaxial superconducting shells** JOHN WATSON, MAJA CASIDY, JAKOB KAMMhubER, MICHIEL DE MOOR, LEO KOUWENHOVEN, Delft Technical University, PETER KROGSTRUP, MINGTANG DENG, THOMAS JESPERSEN, JESPER NYGARD, CHARLES MARCUS, University of Copenhagen — We report progress on epitaxially grown InAs/Al core/shell nanowire heterostructures by molecular beam epitaxy with junctions in the Al shells formed in-situ by a crossed wire shadowing method during growth. Such wires allow the creation of superconductor-normal-superconductor (SNS) junctions with high quality superconductor-semiconductor interfaces without introducing damage in the junction by etching the Al. Shadowing is accomplished by a two-step growth process in which the nanowire growth direction is changed resulting in crossed networks of nanowires which shadow one another from the Al flux. We observe hard superconducting gaps and supercurrents in excess of 50 nA with in-plane critical fields above 1 T. We compare our results with shadowed devices to previous data from SNS junctions with wet-etched shells. Our experiments indicate that this crossed wire shadowing technique provides an interesting route to investigating induced superconductivity in semiconductor nanowires.

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