Bottom-up grown nanowire quantum devices

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Signatures of Majorana's have been obtained in devices based on InSb nanowires coupled to a superconductor [1]. Different schemes for uncovering their unique non-Abelian statistics are proposed, for which a nanowire network assembly is needed. Here, we demonstrate a generic process by which we can design any proposed nanowire network device by manipulating an InP substrate and thereby the nanowire growth position and orientation [2]. Nanowire "hashtag" structures are grown in which phase coherent transport is demonstrated by the Aharonov–Bohm (AB) effect. In addition, we can in-situ grow epitaxial Al islands on the nanowires, resulting high quality interfaces. We employ here self-shadowing structures, such that complete device can be realized by bottom-up grown techniques. With these new devices we have observed a quantized Majorana signal [3].

1. V. Mourik *et al*., *Science* **2012**, 336, 1003.
2. S. Gazibegovic *et al*. *Nature* 548 **2017**, 434.
3. H. Zhang et al. *Nature* **2018**, *556, 74*.

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After obtaining his PhD in nanoelectrochemistry at the University of Utrecht, Erik started working at Philips Research in Eindhoven in 2000. He started his own research group, and the team focused on nanowires - lines of material with a width of several tens of nanometers- an area he continues to research, looking at integration into semiconductors in particular. In 2010, his growing interest in fundamental research resulted in Erik joining the Technical University of Eindhoven as well as Delft Technical University as part-time professor in the Quantum Transport group. His current interest is in Quantum Materials, to detect and manipulate Majorana states, and in Hexagonal Silicon, to demonstrate and exploit the predicted direct band gap in this material. He has received the Technical Review award from MIT, VICI grant, ERC CoG, and the Science AAAS Newcomb Cleveland Prize.