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CV

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, ERC AdG, the Science AAAS Newcomb Cleveland Prize 2013, and the 'Breakthrough of the Year 2020 award' by Physics World.

Efficient light emission from hexagonal SiGe

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Silicon and germanium cannot emit light efficiently due to their indirect bandgap, hampering the development of Si-based photonics. However, alloys of SiGe in the hexagonal phase are predicted to have a direct band gap. In this work, we exploit the unique feature of the nanowire growth mechanism to control the crystal structure by tuning the contact angle of the catalyst particle and demonstrate the optical properties.[1] We show efficient light emission up to room temperature accompanied by a short radiative life time, the hallmarks of a direct band gap material. The band gap energy is tunable in the range of 0.35 till 0.7eV opening a plethora of new applications. We have found the first signatures of lasing in this material. We finally discuss possible routes to integrate this material in Si- technology.

[1]E.M.T. Fadaly *et al.*, ***Nature*** 580, 205 (2020).

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