

Abstract Submitted
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Anisotropic fluorocarbon plasma etching of Si/SiGe heterostructures¹ RUHANG DING, AMY WENDT, LEVENTE KLEIN, MARK ERIKSSON, University of Wisconsin - Madison — Fluorocarbon plasma etching of SiGe heterostructures for fabrication of quantum devices is investigated. The heterostructures consist of layers of silicon and SiGe, and anisotropic etching of the heterostructures using plasmas to isolate device elements is an attractive approach to fabricating devices. A challenge that has limited the use of fluorocarbon etching is the difference in Si and Ge etch rates. Preferential etching of SiGe can lead to undercutting beneath the top silicon layer, causing a reduction in critical device dimensions of unknown magnitude. To improve anisotropy of the etch process, we propose the use of fluorocarbon etch gases with higher carbon content, making use of fluorocarbon sidewall passivation to improve the anisotropy of etched feature profiles by preventing lateral etching of SiGe. Initial etch results in a C₄F₈/Ar/N₂ gas mixture show a straight sidewall profile through the layers of the heterostructure. Furthermore, control of the energy distribution of bombarding ions has been implemented to enhance etch selectivity to PMMA used as an etch mask.

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