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Structural and optical properties of silicon nanowires

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Abstract content
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Silicon nanowires (Si NWs) find application in radial solar cells, mainly due to its excellent anti-reflective properties and improved conductivity. An additional advantage of Si NWs is that the superior material-quality requirement for efficient solar cells can be relaxed, since the required transport length of the minority charge carriers are greatly reduced. In this contribution, we report on the top-down growth of Si NWs by metal-assisted chemical etching with the emphasis on the effect of etching time on its structural and optical properties. A controlled density and diameter of the Si NWs are achievable with this technique, as confirmed with scanning electron microscopy. Changes in the symmetry and position of crystalline silicon transverse optical peak are observed in its vibrational spectra, which find its origin in the evolution of the structural properties. The Si NWs also show an appreciable reduction in its reflectivity as compared to planar Si (100).

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