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**Low-field mobility in ultrathin silicon nanowire junctionless transistors** BART SOREE, WIM MAGNUS, WILLIAM VANDENBERGHE, imec, UNIVERSITEIT ANTWERPEN COLLABORATION, KULEUVEN COLLABORATION — We theoretically investigate the phonon, surface roughness and ionized impurity limited low-field mobility of ultrathin silicon n-type nanowire junctionless transistors in the long channel approximation with wire radii ranging from 2 to 5 nm, as function of gate voltage. A few years ago, the junctionless nanowire transistor (JNT) or pinch-off nanowire was proposed by several research groups and was recently fabricated for the first time. The JNT is a uniformly doped nanowire with no junctions, i.e. source, channel and drain are doped with the same doping type. The main motivation for introducing this novel device concept are the absence of doping junctions which makes the fabrication easier, and the reduction of detrimental interactions occurring at the interface between the silicon body of the wire and the insulator (surface roughness). We investigate the case where due to quantum mechanical confinement the surface roughness scattering becomes again important and we report on the behavior of phonon, ionized impurity and surface roughness limited mobility as a function of radius and gate voltage.

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