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# Mobility and Carrier Concentration Measurements on nm-Wide Semiconductor Fins

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Along the scaling path, the microelectronic industry faces numerous challenges in the growth of group IV semiconductors, such as Ge and GeSn. Especially Ge<sub>1-x</sub>Sn<sub>x</sub> is a promising candidate for source-drain applications and as a stressor in Ge channel devices. However, the material properties of scaled devices can strongly deviate from their bulk counterparts and therefore reliable characterization methods are needed. Measuring the electrical properties of real device structures is particularly important to verify the degree of activation and material quality, both during and after processing. The sheet resistance, sheet carrier density and mobility are well-suited parameters to provide that information. In this study, we demonstrate the capabilities of a micro four-point probe technique in taking advantage of thermoelectric properties for characterization of nm-wide semiconductor fins. This is done by performing a four-point probe measurement with an AC current providing us with the first and second harmonics, which are related to the sample resistance and Seebeck coefficient, respectively. From the Seebeck coefficient, we can determine the charge carrier density directly. Subsequently, the carrier mobility can be extracted using the resistance signal and the Seebeck coefficient combined. We will perform these measurements on fins of B-doped Ge<sub>1-x</sub>Sn<sub>x</sub> on relaxed Ge, which are epitaxially grown in trenches. In this way, the precision of the method can also be evaluated.