Abstract Submitted
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Strain-superlattice nanowires via SiGe epitaxy on ultrathin Si ribbons[1] C. RITZ, Univ. of Wisconsin-Madison, YU ZHANG, DECAI YU, Univ. of Utah, D. SAVAGE, Univ. of Wisconsin-Madison, C.-H. LEE, California State Univ.-Fresno, FENG LIU, University of Utah, M. LAGALLY, University of Wisconsin-Madison — We demonstrate a method to create a system of precisely positioned strain superlattice nanowires. These are similar to superlattice nanowires, which are traditionally created by VLS growth techniques and are of great interest for thermoelectric applications. We pattern the top layer of thin Si-on-insulator (SOI) into nanoribbons and undercut them, leaving freestanding bridges that are directly integrated into microfabricated devices. The thin freestanding Si is used as a substrate for the Stranski-Krastanov growth of coherent 3D Ge islands, where the thinness of the Si allows for island-island interactions through the ribbon thickness. This elastic interaction causes lateral order in island positions, forming a strain superlattice. A periodic bandgap modulation can result from the periodic island-induced strain. The combination of strain and bandgap modulation should act to improve the thermoelectric figure of merit of these structures. Thermal conductivity measurements of such structures will be discussed.

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Clark Ritz
University of Wisconsin-Madison

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