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Thermoelectric Power of high concentration embedded Nanoparticle Samples MONA ZEBARJADI, KEIVAN ESFARJANI, ALI SHAKOURI, ZHIXI BIAN, University of California, Santa Cruz, JE-HYEONG BAHK, GEHONG ZENG, JOHN BOWERS, HONG LU, JOSHUA ZIDE, ART GOSSARD, University of California, Santa Barbara, UNIVERSITY OF CALIFORNIA, SANA CRUZ TEAM, UNIVERSITY OF CALIFORNIA, SANTA BARBARA TEAM — High concentrations of embedded nano-particles inside thermoelectric elements are desirable because they can reduce the thermal conductivity. But they also affect the power-factor. Therefore they can enhance or suppress the figure of merit. We model the effect of such high concentrations on the power-factor using the coherent potential approximation. We optimize the power-factor versus nano-particle size, distribution and concentration. The analysis would help in designing nano-particle embedded matrices with high-performances. We characterize InGaAlAs samples with 3-10% volume concentration of ErAs nano-particles and explain their properties such as the mobility and the Seebeck coefficient theoretically.

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