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Crystal structures and physical properties of nanostructured $[(PbSe)_{0.99}]_m(WSe_2)_n$ (m, n=1-5) QIYIN LIN, Materials Science Institute, University of Oregon, Eugene, Oregon 97403, COLBY HEIDEMAN, CLAY MORTENSEN, NGOC NGUYEN, DAVID C. JOHNSON[1], Materials Science Institute, University of Oregon, Eugene, Oregon 97403, PAUL ZSCHACK, Advanced Photon Source, Argonne National Laboratory, Argonne, IL 60439, CATALIN CHIRITESCU, DAVID G. CAHILL, Department of Materials Science and Engineering, University of Illinois, Urbana, IL 61801 — We report a class of nanostructured misfit layered compounds $[(PbSe)_{0.99}]_m(WSe_2)_n$ (m,n=1-5) synthesized using a modulated elemental reactant technique. The structures are built of two subsystems alternately stacking along the c direction - a distorted rock salt structure (PbSe) and a transition metal dichalcogenide (WSe_2). These nanostructured compounds have ultra low thermal conductivities, as small as $0.06 Wm^{-1}K^{-1}$, which can be attributed to the structural misfit between the components resulting in an unusual balance of order and disorder. Annealing samples under different partial pressures of selenium can be used to control electrical conductivity and the value of the Seebeck coefficient. The relationship between nanostructures and physical properties will be discussed.

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