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Composition Dependence of Elastic properties in M_2AX Materials[1] T. SCABAROZI, Materials Science and Engineering, Drexel University, S. E. LOFLAND, J. D. HETTINGER, Department of Physics and Astronomy, Rowan University, S. AMINI, P. FINKEL, M. BARSOUM, Materials Science and Engineering, Drexel University — We report on correlations between thermal expansion, elastic modulii, thermal transport, specific heat, and electrical transport measurements of materials within the MAX-phase family. Elastic modulus measurements are made using an ultrasonic time of flight technique. Thermal expansion measurements are made using high-temperature x-ray diffractions. We see a clear variation in elastic properties in materials of the form M_2AC(M=Ti) with A=S having the largest elastic modulus of all M_2AX materials measured to date. It also has the largest Debye temperature as measured from specific heat. The phonon contribution to the thermal conductivity is relatively large, similar in size to the thermal transport resulting from charge carriers. The elastic modulus approaches that found in Ti_3SiC_2, a M_3AX_2 material. The overall goal of this work is to correlate measurements of these properties varying M and A to unravel the role of both lattice constituents in determining the elastic properties of this class of materials.

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