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The effect of M (M=Ti, Cr, V, Nb) on transport and elastic properties of nanolayered ternary carbides M_2AlC JEFF HETTINGER, PETER FINKEL, SAM LOFLAND, Rowan University, MICHEL BARSOUM, ADRISH GUPTA, Drexel University — We report on a systematic investigation of the electronic, magneto-transport, thermal and elastic properties of the family of materials M_2AlC where M is Ti, V, Cr or Nb in the temperature range 4 to 300K. The elastic constants were measured for all compounds ultrasonic technique. The bulk moduli and anisotropic Young's moduli found to be varied in these compounds for various transition metal M. The Debye temperatures were high in the 640-710 K range and quite insensitive to composition. The Seebeck coefficient was a non-monotonic function of a temperature: at the lowest temperatures is small but increases with increasing temperature and saturates at 60-80 K and goes through zero again manifesting change in the dominating charge carrier type. The electrical conductivity, Hall coefficient and magnetoresistances are analyzed within a two-band framework assuming a temperature-independent charge carrier concentration. We concluded that there is little correlation between the Seebeck voltage and Hall number. As with other MAX-phase materials, all these materials are nearly compensated. Comparisons of these results will be presented. Results will be discussed in relation to theoretical work and recent measurements on related systems.

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