

BOND LENGTH EVOLUTION IN 312 AND 211 MAX PHASES FROM HIGH TEMPERATURE NEUTRON DIFFRACTION AND RIETVELD ANALYSIS

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Abstract

The MAX phases are a family of ternary layered compounds with the general formula $M_{n+1}AX_n$, where n is 1, 2 or 3, M is an early transition metal (the metals appearing on the left-hand side of the center section of the periodic table), A is an A-group element (appearing generally in sections IIIA or IVA of the periodic table), and X is carbon or nitrogen, or both. The most striking facet of the mechanical response of the MAX phases is its almost schizoid nature; it is not quite sure whether it wants to be a metal or a ceramic. Like a metal it is machinable, thermally and electrically conductive, resistant to thermal shock and plastic at elevated temperatures. Like a ceramic it is refractory (its decomposition temperature is greater than 2,000 degrees Celsius), oxidation-resistant, quite stiff and relatively light (4.5 grams per cubic centimeter). To characterize the thermal behavior of these phases, we conducted high temperature neutron diffraction studies of Ti_3SiC_2 , Ti_3GeC_2 , $Ti_3(Si,Ge)C_2$, Ti_2GeC , Cr_2GeC , and Ti_2SC on the HIPPO beam line at LANSCE. The data was analyzed using the Rietveld method and changes of structural parameters such as lattice parameters, bond lengths, anisotropic thermal motion, and texture were extracted. In this presentation we will give an overview of our results.

Information Page

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Oral Presentation

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