High Strength, High Toughness TiC-Ni_3Al

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Abstract:

TiC-Ni_3Al cermets containing ≤ 60 vol. % Ni_3Al were prepared by vacuum sintering. Available Ni_3Al powders tended to be coarse resulting in large Ni_3Al regions or large pores. These were eliminated and a very uniform microstructure resulted using a mixture of Ni + NiAl. The linear thermal expansion coefficients increased from 7 to 11 x 10^{-6}/°C for Ni_3Al contents from 0 to 60 vol. %. The flexure strengths were typically > 1 GPa when the Ni_3Al content was ≥ 20 vol.%. The fracture toughness increased from 8 to 17^{+} MPa√m with increase in Ni_3Al from 8 to 60 vol. %.

The research was sponsored by the U. S. Department of Energy, Office of Transportation Technology, Heavy Vehicle Propulsion Systems Materials Program under contract DE-AC05-00OR22725 with UT-Battelle, LLC.

For presentation at the American Ceramic Society's Engineering Ceramics Division Meeting, Cocoa Beach, FL, January 21-26, 2000