Nondestructive measurement of the composition of advanced armor materials by ion beam analysis.

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ABSTRACT:

Lightweight, state-of-the-art armors rely on ceramics for their enhanced performance. One goal of the United States Army is to expand the industrial base of companies that provide the armors. A systematic study of armor performance as a function of ceramic stoichiometry will result in a better understanding of the fundamental relations between composition and mechanical performance. One ceramic of interest is aluminum oxynitride (AlON). The stoichiometries of representative samples of AlON were investigated with the nondestructive techniques of Rutherford backscattering spectrometry and resonant nuclear reaction analysis. Future tests of the performance of the armor samples are to be correlated with the stoichiometries and hence, will lead to optimum, standardized processes for the manufacture of each of the ceramics investigated.

KEYWORDS: Armor, ceramic, AlON, Rutherford backscattering spectrometry, resonant nuclear reaction analysis, stoichiometry.

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