

Abstract Submitted
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Reaction Kinetics of Nanostructured Silicon Carbide KENDRA

WALLIS, T.W. ZERDA, Texas Christian University — Nanostructured silicon carbide (SiC) is of interest particularly for use in nanocomposites that demonstrate high hardness as well as for use in semiconductor applications. Reaction kinetics studies of solid-solid reactions are relatively recent and present a method of determining the reaction mechanism and activation energy by measuring reaction rates. We have used induction heating to heat quickly, thus reducing the error in reaction time measurements. Data will be presented for reactions using silicon nanopowder (< 30 nm) and carbon multi-walled nanotubes with diameter 60 - 100 nm at five different temperatures below the melting point of silicon. Using the well-known Avrami-Erofeev model, a two-parameter chi-square fit of the data provided a rate constant (k) and parameter (n), related to the reaction mechanism, for each temperature. From these data, an activation energy of 138 kJ/mol was calculated. In addition, the parameter n suggests the reaction mechanism, which will also be discussed. Experiments are continuing at higher temperatures to consider the liquid-solid reaction as well.

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