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Detonation Synthesis of Alpha-Variant Silicon Carbide MARTIN LANGENDERFER, CATHERINE JOHNSON, WILLIAM FAHRENHOLTZ, VADYM MOCHALIN, Missouri Univ of Sci & Tech — A recent research study has been undertaken to develop facilities for conducting detonation synthesis of nanomaterials. This process involves a familiar technique that has been utilized for the industrial synthesis of nanodiamonds. Developments through this study have allowed for experimentation with the concept of modifying explosive compositions to induce synthesis of new nanomaterials. Initial experimentation has been conducted with the end goal being synthesis of alpha variant silicon carbide (α-SiC) in the nano-scale. The α-SiC that can be produced through detonation synthesis methods is critical to the ceramics industry because of a number of unique properties of the material. Conventional synthesis of α-SiC results in formation of crystals greater than 100 nm in diameter, outside nano-scale. It has been theorized that the high temperature and pressure of an explosive detonation can be used for the formation of α-SiC in the sub 100 nm range. This paper will discuss in detail the process development for detonation nanomaterial synthesis facilities, optimization of explosive charge parameters to maximize nanomaterial yield, and introduction of silicon to the detonation reaction environment to achieve first synthesis of nano-sized alpha variant silicon carbide.

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