Pembakaran sintesis dari nonstoichiometric titanium carbon untuk memproduksi luas permukaan yang besar = Combustion synthesis of nonstoichiometric titanium carbide to produce high surface porous material

Vincent Lee, author

Abstrak

Combustion synthesis, or more specifically self-propagating high temperature synthesis, is an efficient manufacturing process that is used for a variety of advanced materials including powders, near-net shape products and functionally graded materials. This project investigated the combustion synthesis of one nonstoichiometric titanium carbide system with the aim to produce high surface-area porous materials. The system investigated was the (1+x)Ti + C system where x = 1.4, x = 1.6 and x = 1.7 and were successful SHS reactions. The combusted samples produced from the x = 1.4 system were qualitatively analysed with Scanning Electron Microscopy, showing porosity variation in the distance from the ignition point. X-Ray Powder Diffraction was performed on one of the samples and shows similar composition yet differing crystal structures to some comparable TiCx compounds. Velocity Profiles were taken to determine that the reaction wavefront begins in the middle of the sample and after ignition travels more rapidly on the outside. 500W of power is required to heat the Tungsten filament to the temperature required to initiate propagation of the reaction. The x = 1.6 and x = 1.7 velocity profiles were analysed and it was concluded that the x = 1.6 reaction wavefront is faster than the x = 1.7 reaction wavefront.