OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference and Exhibition on
Materials Science & Engineering

October 07-09, 2013 Hampton Inn Tropicana, Las Vegas, NV, USA

Understanding the effect of filler size in ultra-high molecular weight polyethylene composites with nano- and micron-size boron nitride

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A detailed comparison of the properties and microstructures of conventionally sintered and microwave sintered samples of 3 mol% and 8 mol % yttria zirconia was performed. Identical thermal profiles were used for both types of heating. For both materials, microwave heating was found to enhance the densification processes which occur during constant rate heating. The 3 mol% yttria zirconia material exhibited a shift in the grain size/density relationship which favours densification, resulting in higher density samples with smaller grain sizes at densities below 96% of theoretical density. At higher densities, significant grain growth occurs. For the 8 mol% yttria zirconia material, the grain size/density relationship remained unchanged. Differences in the response of the two materials are attributed to the differences in the activation energy for grain growth, and in grain boundary mobility. Modulus of rupture and toughness of both microwave and conventionally sintered samples were similar. Following isothermal heating at 1300 °C, microwave heated samples were found to be significantly denser than conventionally heated samples. This temperature also restricted grain growth once densification was approaching completion. These findings have significant implications for the commercial application of microwave sintering. It appears that this method of sintering produces a superior product to conventional sintering.

Biography

Peter Walker Thompson is a Ghanaian born on 22nd May, 1986 and studied at the Kumasi High School till early 2002 where he studied General Sciences. From there, he went to live in South Africa for years where he was working with a computer firm as a research programmer in 2007. He then moved to Ghana to work with the All-tech Ghana Limited.

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