BHE 010

Novel Processing of Stainless Steel Foams for Structural and Biomedical Applications

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Abstract

It is clear that for ceramic foam precursor (CFP) technology to be useful to Pennsylvania companies, the foams must be able to be manufactured on an industrial scale and at reasonable cost. From this standpoint, the Lehigh CFP process has several inherent advantages, in that the fabrication of the ceramic foam precursor is already an established, low-cost manufacturing route. Further, the conversion process requires only standard heat-treatment facilities which are widely used in the metals industry. Currently, a reduction process has been established which is effective for laboratory scale samples. This project proposes to undertake process modeling to determine how the reaction kinetics will vary with component size and what modifications of the processing parameters (pO2, temperature of reduction) are required to enable cost effective manufacturing of large components. An important parameter in the modeling will be the permeability of the metal/ceramic foam to hydrogen, which will be determined experimentally. The PIs have established expertise in this area, having successfully developed a model for the converse type of reaction, i.e., oxidation in reaction bonded (RBAO) ceramics, which enabled optimization of the process.