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ABSTRACT

Additive Manufacturing of Functionally Graded rGO/YSZ Materials

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The production of ceramic-based devices, such as solid oxide fuel cells, is usually complex and time consuming [1]. For this reason, additive manufacturing techniques have been positioned as competitive processes to obtain advanced ceramics with complex geometries, flexible designs, and gradation [2,3]. In this work, material extrusion additive manufacturing and spark plasma sintering were used to produce functionally graded rGO/YSZ, as the addition of rGO promotes mixed-ionic and electronic conduction [4]. Different strategies were designed to obtained graded materials with rGO contents from 0 to 3 vol%. The optimization of the slurries and operational parameters based on the material composition and shrinkage ratio, among others, was carried out. The softness of the transition at the interface of the printed layers were also characterized, as it can strongly condition the electrical properties trough the printed layers and compromise the mechanical stability or promote delamination. Electrical and mechanical properties were characterized in sintered samples and compared to the ones of samples obtained by conventional methods.

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