



Nitrogen-doped zirconia single crystals

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Abstract

The aim of this work is the preparation of nitrogen-doped single crystals of cation-stabilized zirconia. Thin plates of these crystals were nitrided in a graphite heated resistance furnace with nitrogen as reaction gas. Several dwell times and reaction temperatures were tested and their effect on the amount of incorporated nitrogen is investigated. During nitridation at high temperatures a rock salt-type 'ZrN' layer grows on the surface, leading to the destruction of the crystal. In contrast to the fluorite-type bulk material, which can be described as a fast anion conductor, the surface layer shows electronic conductivity. For possible applications of the bulk material (solid electrolyte) the formation of the surface layer must be avoided. Therefore, the interface between surface epilayer and bulk material was investigated in detail by electron microscopy methods.

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