proceedings

Abstract

Silicon Carbide: A Gas Sensing Material for Selective Detection of SO_2 †

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Silicon carbide (SiC) is a long-time known material with exceptional mechanical properties. Ceramics obtained by sintering SiC grains are very hard and find application in car brakes, bulletproof vests and, in general, in high endurance applications. Moreover, its thermal strength and chemical stability are also extraordinary, maintaining stability at even above 1000 °C, making it possible for use in high temperature applications. Considering these characteristics of silicon carbide, through the combination of stability and surface reactivity, it is possible to obtain a gas sensor suitable for commercial use. Therefore, this study was focused on the investigation of the chemoresistivity properties of SiC thick films in thermo-activation mode. Commercial Silicon Carbide nanopowder was characterized from the morphological, structural and chemical point of view. Then, it was screen-printed onto alumina substrates to obtain thick films and tested as chemiresistive gas sensors. The SiC layers were exposed to 13 gases belonging to different chemical classes, in concentrations within the ppm range and chosen through the Threshold Limit value. The sensors proved to be insensitive to almost all gases analysed, while they showed a significant response to sulphur dioxide in dry conditions. This cross selectivity increased in wet conditions, highlighting a possible sensing application of this material.