World Academy of Science, Engineering and Technology
International Journal of Nuclear and Quantum Engineering
Vol:17, No:02, 2023

Silicon Carbide (SiC) Crystallization Obtained as a Side Effect of SF6 Etching Process

Authors : N. K. A. M. Galvão, A. Godoy Jr., A. L. J. Pereira, G. V. Martins, R. S. Pessoa, H. S. Maciel, M. A. Fraga

Abstract : Silicon carbide (SiC) is a wide band-gap semiconductor material with very attractive properties, such as high breakdown voltage, chemical inertness, and high thermal and electrical stability, which makes it a promising candidate for several applications, including microelectromechanical systems (MEMS) and electronic devices. In MEMS manufacturing, the etching process is an important step. It has been proved that wet etching of SiC is not feasible due to its high bond strength and high chemical inertness. In view of this difficulty, the plasma etching technique has been applied with paramount success. However, in most of these studies, only the determination of the etching rate and/or morphological characterization of SiC, as well as the analysis of the reactive ions present in the plasma, are lowly explored. There is a lack of results in the literature on the chemical and structural properties of SiC after the etching process [4]. In this work, we investigated the etching process of sputtered amorphous SiC thin films on Si substrates in a reactive ion etching (RIE) system using sulfur hexafluoride (SF6) gas under different RF power. The results of the chemical and structural analyses of the etched films revealed that, for all conditions, a SiC crystallization occurred, in addition to fluoride contamination. In conclusion, we observed that SiC crystallization is a side effect promoted by structural, morphological and chemical changes caused by RIE SF6 etching process.

Keywords : plasma etching, plasma deposition, Silicon Carbide, microelectromechanical systems

Conference Title : ICPSIDP 2023 : International Conference on Plasma Surface Interaction and Dusty Plasmas

Conference Location : Lisbon, Portugal

Conference Dates : February 06-07, 2023

Open Science Index, Nuclear and Quantum Engineering Vol:17, No:02, 2023 publications.waset.org/abstracts/158558.pdf