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Abstract

In spite of intense research on ZnO over the past decade, the detailed investigation about the crystallographic texture of as obtained ZnO thin films/coatings, and its deviation with growth surface is scarce. We report a systematic study about the orientation distribution of nanostructured ZnO thin films fabricated by microwave irradiation with the variation of substrates and surfactants. The nanostructured films comprising of ZnO nanorods are grown on semiconductor substrates such as [Si(100), Ge(100)], conducting substrates (ITO-coated glass, Cr coated Si), and polymer coated Si (PMMA/Si) to examine the respective development of crystallographic texture. The ZnO deposited on semiconductor substrates yields mixed texture, whereas c-axis oriented ZnO nanostructured films are obtained by conducting substrate, and PMMA coated Si substrates. Among all the surfactants, nanostructured film produced by using the lower molecular weight of polymeric surfactants (polyvinylpyrrolidone) shows a stronger (0002) texture, and that can be tuned to $(10\bar{1}0)$ by increasing the molecular weight of the surfactant. The strongest basal pole is achieved for the ZnO deposited on PMMA coated Si as substrate, and cetyl-trimethyl ammonium bromide