J Material Sci Eng 2016, 5:8 (Suppl)
http://dx.doi.org/10.4172/2169-0022.C1.050

Symmetry in art and architecture of the western Islamic golden age

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Throughout history, there were always links between geometry and art. These links become especially evident when to the study of ornamental art, we apply the theory of symmetry. The idea to study ornaments of different cultures from the point of view of the theory of symmetry, given by G. Pólya (1924) and A. Speiser (1927), was supported by the intensive development of the theory of symmetry in the 20th century. This work is dedicated to the symmetry in the ornamental art of the western Islamic. Moorish craftsmen developed an original, rich and varied art, which integrated the geometry in the construction of complex patterns. This art which flourished in Andalusia until the 15th century and continues to develop until now in North Africa has evolved over the centuries involving symmetry in its most general sense: harmony, order, consistency and invariance. The ornamental periodic motifs that adorn buildings will be discussed, from the standpoint of the theory of symmetry, existed long before Fedorov (1891), showed that there are only 17 periodic tilings of the plane. On the other hand, quasiperiodic tiling discovered by D. Shechtman (1984), adorn the ancient building in the western Islamic world. The similarity between the patterns and quasicrystals aroused the interest of several crystallographers. Some examples of quasiperiodic patterns found in several Moroccan historical building will be described in term of Penrose tiling and give new quasiperiodic patterns obtained by Aboufadil et al using the multigrid method (2014).

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Structural and morphological characterization of tin oxide films prepared by the RGTO method

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Tin oxide (SnO_2) is a largely used material in different domains such as nanocrystalline photovoltaic cells and gas sensing. In this work, this material was deposited by the RGTO method (rheotaxial growth and thermal oxidation). This technique, which consists of the thermal oxidation of the Sn films deposited onto heated glass substrate at a temperature close to tin melting point (232°C), allows preparing high porosity tin oxide films. This films type is very suitable for the gas sensing. The films structural and morphological properties pre and post oxidation were studied using the X-ray diffraction (XRD) and the scanning electron microscopy (SEM), respectively. XRD patterns showed a polycrystalline structure of the cassiterite phase of SnO_2. The grain size increased as a function of the oxidation time and tended to saturate. This grain size evolution was confronted to existing grain growth models in order to understand the growth mechanism. From SEM images, the deposited Sn film was formed of difference diameter and spherical agglomerations. As a function of the oxidation time, these spherical agglomerations size increased and their shape changed due to the introduction of oxygen ions. The deformed spheres started to interconnect by forming bridges between them. These bridges induced the decrease of the electrical resistivity

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