11-Surfaces, Interfaces and Thin Films

PS-11.02.07 MICROSTRUCTURAL CHARACTERISTICS OF CuGaTe2 POLYCRYSTALLINE THIN FILMS. BY B. Mansour, S.H. Sayed and Seham A. Abd El-Hady*, Faculty of Science, Helwan, 11792, Cairo, Egypt

CuGaTe2 thin films deposited on glass substrate by thermal evaporation at vacum of its prepared ingot has been structurally investegated by X-rays . The films prepard at substrate temperature 270 C, rate of evaporation (40-60) A/s and thickness 2320 A were polycrystalline with minimum percentage of other phases . All samples are found to be tetragonal with a=6.0152 and c=11.597 A . The (112) peak undergoes a high degree of prefered orientation. The analysis of the optical constants of the films gave several energy gap values, 0.84, 1.02, 1.21, 1.28 and 1.58 ev. Thesæ are discussed in view of the composition of the films and its thermal treatments . The results are compared with that of thin films deposited on mica .

PS-11.02.08 TWINNING OF DIAMOND SYNTHESIZED BY ACETYLENE FLAME. By S.H. Lyoo, Y.H. Park, Y.S. Lee and S.J. Chung*, Department of Inorganic Materials Engineering, Seoul National University, Seoul 151-742, Korea.

Uniform diamond films in a few mm^2 area and locally isolated diamond crystals in size of 50μm were synthesized on Si-wafer by acetylene flame. Well faceted diamonds could be obtained when the flow ratio of oxygen to acetylene was in the range of 0.90~0.95 and the substrate temperature in the range of 800~1050℃. The crystal forms changed from octahedron to cubo-octahedron with increasing substrates temperature. Large isolated crystals could be obtained in the temperature range of 950~1050℃. Above 1050℃ the {111} face became rough, new crystallites began to grow on {111} face and twinned crystals were usually formed. A few of twinned crystals were up to 80μm in size which exhibited icosahedral form with the twin law of {111}. X-ray precession photographs of this twinned crystals showed a five fold symmetry with the splitting of the reflections. The twin law could be determined by electron diffraction.

PS-11.02.09 INVESTIGATION OF THE ORIENTATIONAL DIS-TRIBUTION OF CONSTITUENT CRYSTALLITES IN A THICK FILM OF $Bi_2Sr_2CaCu_2O_X$. By K.Yukino, F.P.Okamura, and K.Takahashi, National Institute for Research in Inorganic Materials, Namiki 1-1, Tsukuba, Ibaraki 305, and N.Kanou and S.Tsutsumi, School of Science and Engineering, Waseda University, Okubo 3-4-1, Shinjuku-ku, Tokyo 169, and S.Sueno, Department of Geosciences, University of Tsukuba, Tsukuba, Ibaraki 305, Japan

The orientational Distribution of crystallites in a thick film of $Bi_2Sr_2CaCu_2O_X$(Bi2212) was investigated by Scanning X-ray Diffracto-Microscope(SXDM)/X-ray Powder Diffractometer(XPD)(K.Yukino et al., Adv. in X-Ray Analys., 1992,35,1275), which uses a convergent incident beam onto the specimen. The specimen was prepared from a pelletized starting powder mixture, by calcinating at 800 °C for 10hrs. and melting at 1100°C, followed by rapid quenching through a couple of stainless steel rollers. The resultant amorphous thick film was successively slow-cooled on an alumina ceramic substrate from 915°C in air,at the cooling rate of 5°C/hr., to obtain a highly oriented thick film of Bi2212 superconductor. The ε-scan patterns(K.Yukino & R.Uno,Jpn.J.Appl.Phys. 1986,25,661) at several separate positions along the surface of the specimen are shown in Fig.1. The pattern at the central part of the specimen shows a profile of extremely preferred orientation, accompanied by shoulders at the interval of 1° or 2°. This profile suggests that (001) planes of the crystallites in the specimen are oriented almost parallel to the specimen surface, of which the FWHM of the distribution curve is ca. 5°,the diffraction planes showing a 'zig-zag' arrangement along the specimen surface with tilting angle of 1° or 2°. Furthermore, the Debye-Scherrer pattern of the specimen is similar to the rotation photograph of a single crystal. It is also estimated from the diffraction patterns in Fig.1 that,on the assumption that the surface of all the crystallites at the surface are parallel to the specimen surface, the specimen surface itself is considered to be convexed by curvature of ca. 2°/mm, which was proved by $2\theta/(\theta+\varepsilon)$ scan and confirmed by direct measurement of the thickness of the specimen and also by optical microscope observation. The microscopic observation simultaneously revealed the existence of numerous parallel streaks together with round spots along them. The composition of this precipitaion? spot is presently under investigation by EPMA. The SEM pattern of the cross section of the specimen shows that (001) planes of crystallites are oriented parallel to the specimen surface down to the depth of 30~100μm from the surface, and verttical in the deeper zone.

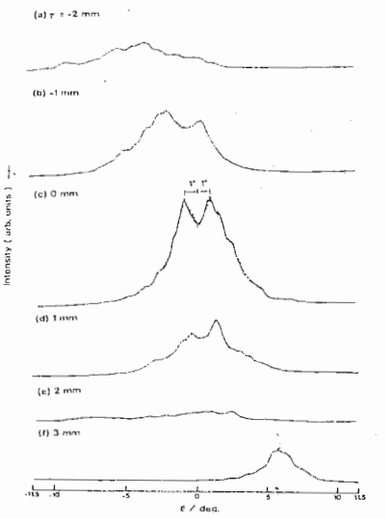

Fig. 1

