11th International Conference on Advanced Materials
Rio de Janeiro Brazil
September 20 - 25
ICAM2009

Sono-Electrolessplating of Tin from Acid Bath

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Abstract - Sonication is powerful agitation. The bath was 0.095 mol/dm^3 $NiSO_46H_2O$, 0.3 mol/dm^3 NaH_2PO_2, 0.06 mol/dm^3 $Na_3C_6H_5O_72H_2O$, and pH 8.5. The temperature was 353 ± 3 K. The plating rate in sonication had a little faster compared with that in stationary state with micro-jet effects. The thickness of plated film was affected with bath temperature and bath composite. When the concentration ratio of Ni and Mo increased and ratio of Mo was decreased, thickness was thicker. The plated film was an amorphous. Plating rate was faster with micro-jet. The surface was smoothed with shock wave pressures.

The substrate was Cu sheet (99.9 % and 0.3 mm thick), with an active area of 1 cm x 2 cm. The counter electrode was Pt plate, with an active area of 2.5 cm x 4 cm, placed 3 cm from the working electrode. The electrodes were polished with # 2000 emery paper and immersed in 6 mol/dm^3 nitric acid solution for several seconds, then rinsed with distilled water and air-dried before the experiments. The composition of Sn bath was 0.35 g/dm^3 $SnSO_4$, 35 g /dm^3 $NaPH_2O_2 \cdot H_2O$, 40 g/dm^3 $Na_3C_6H_5O_7 \cdot 2H_2O$ and 20 g/dm^3 CH_4N_2S. pH was 3.

β-Sn and Sn - Ni alloy plated film were obtained. The thickness of film increased with increasing of plating time and increased with sonication compared with that of sonication. The thickness of Sn films were obtained 0.13 ~ 19.3 μm. The composition of Sn-Ni bath was 0.35 g/dm^3 $SnSO_4$, 5 g/dm^3 $NiSO_4 \cdot 6H_2O$, 35 g /dm^3 $NaPH_2O_2 \cdot H_2O$, 40 g/dm^3 $Na_3C_6H_5O_7 \cdot 2H_2O$ and 20 g/dm^3 CH_4N_2S. pH was 3. Sn and Sn - Ni alloy plated film were obtained. The composition of this plated film was 74.1 wt %Sn - 25.9 wt %Ni. The conditions that Sn - Ni alloys of an arbitrary ratio were get reports on the next time. The surface was smooth, dense and homogeneity with sonication.

References

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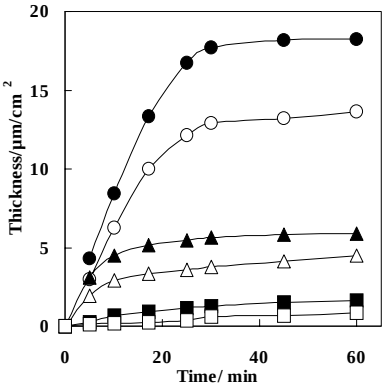

Figure 1: Effect of plating time $SnSO_4$: 35 g/dm^3, $NaH_2PO_4 \cdot H_2O$: 35 g/dm^3, $Na_3(C_3H_5O(COO)_3) \cdot 2H_2O$: 40 g/dm^3, CH_4N_2S: 20 g/dm^3, pH: 3, Bath temperature: 343 K, Sonication:○,△, □; Stationary state, ●, ▲, ■; 28 kHz

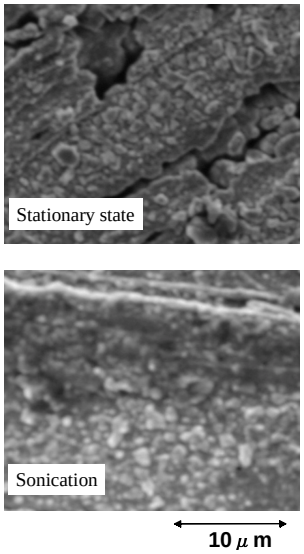

Figure 2: Surface morphology $SnSO_4$: 0.35 g/dm^3, $NaH_2PO_4 \cdot H_2O$: 35 g/dm^3, $Na_3(C_3H_5O(COO)_3) \cdot 2H_2O$: 40 g/dm^3, CH_4N_2S: 20 g/dm^3, pH: 3, Bath temperature: 343 K, Plating time: 30 min

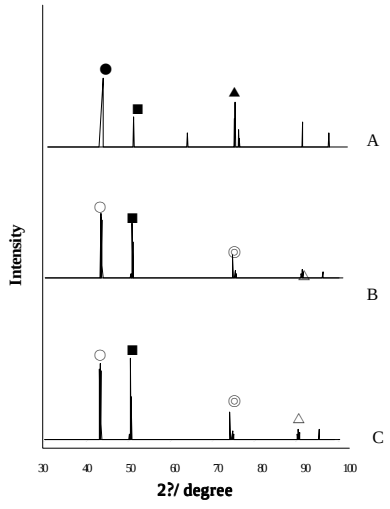

Figure 3: X-ray diffraction patterns A:Sn-Ni(74.1:25.9)film, B;Sn film(28kHz), C:Sn film (Stationary state) $NiSO_4$: 0.35 g/dm^3, $NaH_2PO_4 \cdot H_2O$: 35 g/dm^3, $Na_3(C_3H_5O(COO)_3) \cdot 2H_2O$: 40 g/dm^3, CH_4N_2S: 20 g/dm^3, pH: 3, Bath temperature: 343 K, Plating time: 30 min Crystal plane: ○;β-Sn(200), ◎; β-Sn(420), △; β-Sn(501), ●; (Ni_3Sn_2)5H(002), ▲;(Ni_3Sn_2)5H(112)

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