SA-1

Eutectic structure evolution of Al2O3−ZrO2− Y2O3 system for apotential hybrid solar cell application

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Ternary Al2O3–ZrO2–Y2O3 samples with a eutecticcomposition were prepared by slow cooling. The microstructural evolution wasobserved with X-ray diffraction (XRD), scanning electron microscopy (SEM). TheSEM observation of the ternary samples agreed with the XRD with a completion ofcrystallisation by slow cooling. The target materials commonly have ‘cantaloupe skin’ microstructures as shown inthe previous studies by Han et al. The nanocomposite may have experienceddifferent cooling rates with two different microstructures, near the surfacehaving experienced optimal conditions for the eutectic reaction during theircooling and thus formed the eutectic microstructure, near the centre havingexperienced a slower cooling rate. The crystallised eutectic ternary Al2O3–ZrO2–Y2O3 system had three different phaseswith a 3Y2O3– 5Al2O3 (yttrium–aluminiumgarnet phase), an alumina phase formed by the eutectic reaction, and a solidsolution of ZrO2 and Y2O3.

Keywords: Ternary Al2O3–ZrO2–Y2O3, Eutectic,Nanocomposite, Microstructure, Solar cell

SA-2

Crac-free 나노기공 gold 박막 및 복합박막 제조

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Au-Ag 합금 박막에서 화학적으로 덜 안정한 Ag를 선택적으로 에칭하는 dealloying 기법을 통하여 crack-free 나노기공 gold 박막을 Si 기판에 제조하였다. Au-Ag 합금 박막은 두 가지 방법을 이용하였다: 1) thermal 또는 electron beam 증착법을 이용하여 Au 와 Ag 다층 박막을 Si 기판에 증착시킨 후 열처리를 통한 합금 박막제조; 2) co-thermal 증착법을 이용하여 Au-Ag 합금박막을 Si 기판에 직접 증착. Crack-free 나노기공 gold 박막 제조에 적합한 합금조성을 얻기 위하여 증착 속도, 열처리조건, dealloying 조건등을 조절하였다. Perchloricacid, HClO4 전해질을 이용한 전기화학적 dealloying을 통하여 crack-free 나노기공 gold 박막을 제조하였고, 기공크기를 조절할 수 있었다. 이에 더하여, electrophoretic 방법을 이용하여 나노기공 gold와 semiconductive 양자점 (CdTe 또는 CdSe)의 나노복합박막을 형성시킨 후 특성을 분석하였다.

Keywords: 나노기공, gold, 복합박막