REFLOW OF Sn-3.8Ag-0.7Cu SOLDER ON Ni SUBSTRATE IN PRESENCE OF Mo NANOPARTICLES

M. H. Mahdavifard[1], A. S. M. A. Haseeb*[1] and M. M. Arafat[1]
[1]Department of Mechanical Engineering, Faculty of Engineering, University of Malaya, 50603 Kuala Lumpur, Malaysia
**haseeb@um.edu.my*

Abstract: In this study, Mo nanoparticles were used as a reinforcing material into the Sn-3.8Ag-0.7Cu (SAC) solder on the nickel (Ni) substrate electrodeposited on polycrystalline copper (Cu) sheets. The Mo nanoparticles were characterized by transmission electron microscopy (TEM) and X-ray diffractometer (XRD). The composite solder pastes were prepared by manual mixing of Mo nanoparticles with the SAC solder paste. Ni layer was electrodeposited on polycrystalline Cu substrate by using the Watts bath. The solder paste was placed on the substrate by following the Japanese Industrial Standard (JIS) and reflowed up to six times at 250°C for 45 seconds. After first reflow, elemental compositions of the nanocomposite solders were analyzed by inductively coupled plasma-optical emission spectrometer (ICP-OES). The spreading rate and wetting angle of the solder were determined after first reflow. Microstructural investigations at the solder joints were carried out by using high resolution field emission scanning electron microscope (FESEM) and energy dispersive X-ray (EDX). Results reveal that after reflow only a fraction of Mo nanoparticles were retained inside the solder matrix. Mo nanoparticles are effective in suppressing the growth of total IMC layer and scallops during reflow. The retardation of IMC thickness and scallop diameter is suggested due to the discrete particle effect of Mo nanoparticles.