Tensile Strength and Microstructure of Cu-Cu Joints Soldered with SnAgCu-xCe Alloys

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Abstract. A series of near-eutectic Sn-Ag-Cu-xCe (x = 0, 0.01, 0.02, and 0.17 wt. %) solder alloys were prepared by induction melting under Ar protective atmosphere. The concentration of Ce in the solder alloys was measured by optical emission spectrometry. The near-eutectic Sn-Ag-Cu-xCe solders were utilized for producing of Cu-Cu soldered joints. The soldered joints were subsequently tested on an universal testing machine and ultimate tensile strength of each joint was obtained. The microstructure of tested specimens was analyzed to examine the path of crack propagation and the intermetallic layer at the solder-substrate interface. It was found that only the smallest additions of Ce improve the mechanical strength of soldered joints. If Ce fraction exceeds 0.17 wt. %, the mechanical strength of joints decreases below that of the original alloy without Ce addition.