

Pengaruh Metode Pencelupan Terhadap Struktur Mikro dan Sifat Mekanik Paduan Ingat Bentuk Cu-26,5Zn-5,15Al = Effects of the Quenching Methods on the Microstructure and Mechanical Properties of Cu-26,5Zn-5,25Al Shape Memory Alloy

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Abstrak

ABSTRAK

Paduan Ingat Bentuk Cu-Zn-Al memiliki sifat ingat bentuk yang baik dimana lebih ekonomis dibandingkan paduan ingat bentuk lainnya. Pada penelitian ini, paduan Cu-26,5Zn-5,15Al wt. % hasil pengecoran gravitasi yang dihomogenisasi pada 850 oC selama 2 jam diberikan laku pelarutan di 850 oC selama 30 menit diikuti tiga metode pencelupan yaitu pencelupan langsung (DQ) ke dalam media air + es kering, pencelupan naik (UQ) ke dalam media air + es kering lalu dicelupkan lagi ke air 100 selama 30 menit, dan pencelupan bertahap (SQ) yang dicelupkan ke air 100 selama 30 menit lalu pencelupan ke air + es kering selama 30 menit. Karakterisasi yang dilakukan adalah pengujian OES, pengamatan mikroskop optik, SEM-EDS, pengujian kekerasan microvickers, XRD, dan DSC. Struktur mikro as-cast dan as-homogenized terdiri dari matriks [BCC] dengan fasa kedua [FCC] berbentuk lath dengan rasio fraksi fasa : sebesar 7:93. Sementara, struktur mikro DQ terdiri atas fasa martensit [M18R]. Struktur mikro UQ dan SQ tersusun atas fasa austenit [D03]. Nilai kekerasan bervariasi, sampel DQ memiliki nilai kekerasan tertinggi 241,63 HVN, sementara UQ dan SQ sebesar 192,93 dan 165,4 HVN. Pemulihan regangan tidak dapat diketahui karena ketiga sampel patah saat pemotongan dan pembengkokkan karena sifat getas.....Cu-Zn-Al shape memory alloy has good memory effect which became an economical option. In this study, Cu-26.5Zn-5.15Al wt. % alloy was produced by gravity casting and homogenized (850 oC, 2 hours). Samples were solutionized (850 oC, 30 minutes) followed by three methods of quenching. First is direct quenching (DQ) to cold water (water + dry ice). Second is up quenching (UQ) to cold water followed by heating at 100 for 30 minutes. Third is step quenching (SQ) into the boiling water for 30 minutes, and then into cold water. Characterization included microstructures analysis using optical microstructures and SEM-EDS, Vickers microhardness, XRD, and DSC testing. The microstructures of as-cast and as-homogenized consisted of [BCC] matrix and [FCC] second phase with : phase fraction ratio of 7:93. The microstructures of DQ showed [M18R] martensite phase. Meanwhile, the microstructures of UQ and SQ consisted of [D03] austenite phase. Hardness of DQ was the highest due to the M18R phase. While the UQ and SQ had lower hardness because of the formation of [D03] phase. The strain recovery value could not be observed because the three samples fractured during cutting and bending caused by brittleness.