

## Studi pengaruh penambahan Pb terhadap sifat struktur, termal, dan sifat kekerasan dari paduan Sn-Pb = Study of Pb addition effect to structures, thermal and hardness characteristic of Sn-Pb alloys

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### Abstrak

Paduan SnPb telah digunakan sebagai material solder sejak dahulu. Namun setelah ditemukan adanya kandungan racun yang berbahaya bagi manusia maka pemerintah menggalakkan bebas timbal. Hal ini tentunya memaksa industri untuk mulai mencari pengganti timbal. Berdasarkan hal tersebut dilakukan penelitian untuk melihat pengaruh bertambahnya Pb terhadap sifat struktur, termal dan kekerasan dari paduan SnPb. Paduan SnPb dipreparasi di atmosfer nitrogen dengan menggunakan metode peleburan. Dilakukan variasi kandungan Pb (persen berat) dalam paduan SnPb. Sampel paduan dikarakterisasi menggunakan XRF (X-Ray Fluorescence), XRD (X-Ray Diffraction), DSC (Differential Scanning Calorimetry), SEM (Scanning Electron Microscopic) and Vickers Hardness.

Hasil karakterisasi menggunakan XRD menginformasikan bahwa fasa yang terbentuk hanya fasa Sn dan fasa Pb. Ukuran kristal dihitung menggunakan formula Debye-Scherrer sedangkan parameter kisi dari setiap variasi paduan didapat dengan menggunakan program GSAS. Karakterisasi termal paduan SnPb dengan menggunakan DSC memperlihatkan bahwa semakin menjauhi komposisi eutektik, ditemukan adanya puncak endoterm yang menunjukkan fasa L+. Dan berdasarkan hasil karakterisasi menggunakan SEM ditemukan Pb yang menggumpal pada paduan SnPb saat menjauhi komposisi eutektiknya. Sedangkan untuk sifat kekerasannya dapat diasumsikan bahwa kekerasan paduan SnPb semakin menurun ketika persen berat Pb semakin bertambah yang dikonfirmasi melalui tes vicker hardness.

<hr>SnPb alloy had been used as a material solder from along ago. After it has discovered that lead contains neurotoxin which is harmful to humans, the government now promote a lead free movement for electronic packaging and another appliance. This is certainly forced the industry to start searching for a lead replacement. It was then conducted research to see the effect of adding Pb to structure, thermal and hardness properties of SnPb alloy. SnPb alloy prepared by fusion method within nitrogen atmosphere. The composition of Pb in SnPb alloy are varied All sample variation are characterized using XRF (X-Ray Fluorescence), XRD (X-Ray Diffraction), DSC (Differential Scanning Calorimetry), SEM (Scanning Electron Microscopic) and Vickers Hardness.

From XRD result shows only Sn phase and Pb phase are formed Crystallite size calculated using Scherrer formula, while the lattice parameters obtained from program named GSAS. Thermal study and characterization for all SnPb alloys was measured as a function of temperature using a Differential Scanning Calorimetry. From this measurement revealed the existence of L+ phase when SnPb alloys weren't at the eutectic composition. And based on the results of characterization using SEM found agglomeration of Pb in SnPb alloys except for an eutectic composition. From Vicker Hardness test confirmed that the hardness characteristic of SnPb alloys decreases when increasing weight percent Pb.