

Pengaruh variasi penambahan Ti terhadap karakteristik komposit matriks logam Al-Mg-Si berpenguat partikel mikro Al<sub>2</sub>O<sub>3</sub> hasil stir casting = The effect of ti addition on the characteristics of composite Al-Mg-Si reinforced by micro particle of Al<sub>2</sub>O<sub>3</sub> by stir casting process

Lumban Tobing, Basauli Tiarma Olivia Br., author

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Abstrak

[Penelitian kali ini adalah berfokus pada penguatan matriks guna mendukung sifat optimum material komposit. Penguatan matriks dilakukan dengan penambahan Al-5Ti-1B dan Al-15Sr sebagai pemodifikasi matriks serta penambahan Mg sebanyak 10 wt% sebagai agen pembasahan pada komposit. Penambahan unsur modifikasi, seperti Al-5Ti-1B bertujuan sebagai agen penghalus butir dan Al-15Sr sebagai pemodifikasi dari senyawa fasa kedua yang terbentuk pada matriks paduan aluminium. Komposit pada penelitian kali ini mencapai sifat optimum pada penambahan Ti dan Sr menjadi 0.031 wt% dan 0.06 wt%. Kehadiran unsur Ti dan Sr yang ditambahkan dalam paduan matriks menghasilkan bentuk dendrit yang terfragmentasi menjadi globular yang halus dengan dispersi fasa yang diduga adalah Mg<sub>2</sub>Si dalam morfologi chinese script yang bertransformasi menjadi fibrous kecil dan halus. Selain itu juga tidak ditemukannya fasa berbentuk

jarum atau platelet yang tajam yang berkontribusi terhadap deteorisasi dan penggetasan, seperti Al<sub>3</sub>Fe dalam paduan ini. Struktur yang dimiliki oleh komposit ini dianggap menjadi struktur yang baik untuk menunjang karakteristik matriks. Hal ini dipercaya sebagai alasan tingginya nilai kekuatan tarik serta keuletan yang dimiliki material. Lalu, permukaan patahan pada komposit ini juga menunjukkan kombinasi dari patah ulet dan getas.

.....The research is focused on the strengthening process of the matrix to give an outstanding characteristic of composite material. Strengthening the matrix is done by modification of Al-5Ti-1B dan Al-15Sr addition with 10 wt% Mg addition as the wetting agent. Addition of Al-5Ti-1B acts as grain refinement agent which provide more nucleating site and restrict the growth of grains and Al-15Sr acts as modifiers of the morphology of the second phase particles. The optimization of the composite characteristics is also followed by the maintenance of the casting process which is followed by degassing process.

After the casting process is done, the examination of mechanical properties, chemical composition and examination of the microstructure will be held. The optimum composition of the composite in this research is on the addition of Ti and Sr to be 0.031 wt% dan 0.06 wt%. These elements added to matrix give the fragmented dendritic-like structure of the (Al) as the matrix with the second phases, Mg<sub>2</sub>Si dispersed in the matrix have the fine morphology also. Then, there is observed no deterioration morphology of phases like Al<sub>3</sub>Fe which is used to be needle like or platelet like. This morphology structure is considered to be the best and wanted structure to the matrix and will give optimum characteristics. It is considered that this morphology of the composite is the reason of achieving highest UTS along with increasing in ductility. In the observation of the fractograph, it is found that the mode of fracture is categorized to be the combination of ductile and brittle fracture mode. The research is focused on the strengthening process of the matrix to give an

outstanding characteristic of composite material. Strengthening the matrix is done by modification of Al-5Ti-1B dan Al-15Sr addition with 10 wt% Mg addition as the wetting agent. Addition of Al-5Ti-1B acts as grain refinement agent which provide more nucleating site and restrict the growth of grains and Al-15Sr acts as modifiers of the morphology of the second phase particles. The optimization of the composite characteristics is also followed by the maintenance of the casting process which is followed by degassing process. After the casting process is done, the examination of mechanical properties, chemical composition and examination of the microstructure will be held. The optimum composition of the composite in this research is on the addition of Ti and Sr to be 0.031 wt% dan 0.06 wt%. These elements added to matrix give the fragmented dendritic-like structure of the (Al) as the matrix with the second phases, Mg<sub>2</sub>Si dispersed in the matrix have the fine morphology also. Then, there is observed no deterioration morphology of phases like Al<sub>3</sub>Fe which is used to be needle like or platelet like. This morphology structure is considered to be the best and wanted structure to the matrix and will give optimum characteristics. It is considered that this morphology of the composite is the reason of achieving highest UTS along with increasing in ductility. In the observation of the fractograph, it is found that the mode of fracture is categorized to be the combination of ductile and brittle fracture mode.]