

Study of Properties of Aluminum Wires Treated with Nanoparticles of MoB₂

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The need for a material of lower cost, for electronic packaging as the main use, was the main motivation for the investigation. This objective brought to the question "Is it possible to make a composite at a lower cost with the same or better properties than aluminum-diamond?". The hypothesis was that the low coefficient of thermal expansion of MoB₂ would make it possible to produce a lower cost composite with the same properties of the commercial one, aluminum-diamond. The purpose of the research was to fabricate a nanocomposite of Al/MoB₂ and mix it with melt aluminum to make aluminum wires with different percentages of MoB₂. Different tests such as the following were done to analyze the properties of the wires: XRD characterization, a micrograph with a Nikon® optical microscope, bending properties test according to norm ASTM 1350-H19, electrical resistivity tests, linear coefficient of thermal expansion test and Ultimate Tensile Strength tests with an Instron®. The preliminary results showed an improvement of the properties of Al/MoB₂ such as the decrease of the linear coefficient of thermal expansion when compared with pure aluminum, even though it did not reach the high properties of aluminum-diamond. Therefore it is still possible to increase the amount of MoB₂ in the aluminum matrix and repeat the tests already done to determine if the characteristics of the wires can be improved.