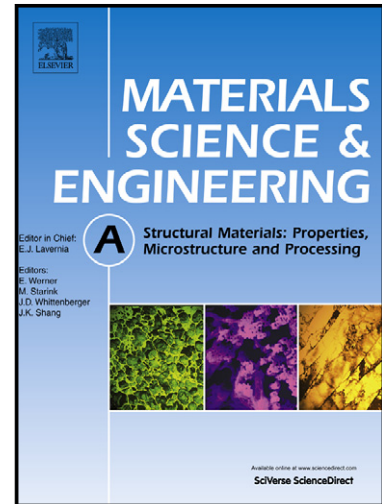


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Effect of inclusions on microstructure and toughness of deposited metals of self-shielded flux cored wires

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Abstract: The effect of inclusions on the microstructure and toughness of the deposited metals of self-shielded flux cored wires was investigated by optical microscopy, electron microscopy and mechanical testing. The deposited metals of three different wires showed different levels of low temperature impact toughness at -40 °C mainly because of differences in the properties of inclusions. The inclusions formed in the deposited metals as a result of deoxidation caused by the addition of extra Al-Mg alloy and ferromanganese to the flux. The inclusions, spherical in shape, were mixtures of Al₂O₃ and MgO. Inclusions predominantly Al₂O₃ and 0.3-0.8 μm in diameter were effective for nucleation of acicular ferrite. However, inclusions predominantly MgO were promoted by increasing Mg in the flux and were more effective than Al₂O₃ inclusions of the same size. These findings suggest that the control of inclusions can be an effective way to improve the impact toughness of the deposited metal.

Keywords: Self-shielded flux cored wire; Deposited metals; Inclusions; Acicular ferrite; Toughness

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