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#### **ACCEPTED MANUSCRIPT**

# Effects of nanometric inclusions on the microstructural characteristics and strengthening of a friction-stir processed aluminum-magnesium alloy

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#### **Abstract**

An aluminum-magnesium alloy was friction-stir processed in the presence of  $TiO_2$  nanoparticles which were pre-placed in a groove on the surface to produce a composite. Field emission-scanning and transmission electron microscopy studies show that solid state

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