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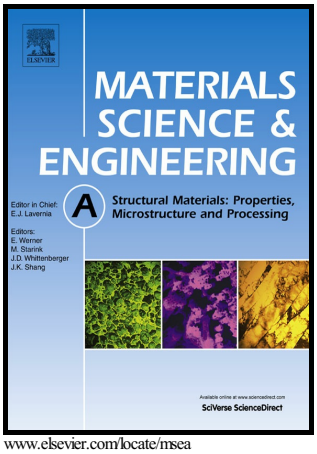


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# Titanium as an intermetallic phase stabilizer and its effect on the mechanical and thermal properties of Al-Si-Mg-Cu-Ti alloy

Se-Weon Choi[a*], Hoon-Sung Cho[b], Shinji Kumai[c]

[a]Korea Institute of Industrial Technology, 6 Cheomdan-gwagiro 208 beon-gil, Buk-gu, Gwangju 500-480, Republic of Korea

[b]School of Materials Science & Engineering, Chonnam National University, 77 Yongbong-ro, Buk-gu, Gwangju 500-757, Republic of Korea

[c]Department of Metallurgy and Ceramics Science, Tokyo Institute of Technology, S8-10, 2-12-1 O-okayama, Meguro-ku, Tokyo 152-8552, Japan



**Abstract**

The effect of precipitation of intermetallics on the mechanical and thermal properties of Al-6.5Si-0.44Mg-0.9Cu-(Ti) alloys (in wt.%) during various artificial aging treatments was studied using a universal testing machine and a laser flash apparatus. The solution treatment of the alloy samples was conducted at 535 °C for 6 h, followed by quenching in warm water. The solution-treated samples were artificially aged for 5 h at different temperatures ranging from 170 °C to 220 °C. After the artificial aging treatment, the Al-6.5Si-0.44Mg-0.9Cu alloy (the Ti-free alloy) had a lower ultimate tensile strength (UTS) than the Al-6.5Si-0.44Mg-0.9Cu-0.2Ti alloy. The UTS response of the alloys was enhanced by the addition of Ti, with the maximum UTS showing an increase from 348 MPa for the Ti-free alloy to 363 MPa for that containing 0.2 wt.% Ti, aged at 180 °C. The Ti-free alloy had a higher thermal diffusivity than the Ti-containing alloy over all temperature ranges. Upon increasing the temperature from 180 °C to 220 °C, the room temperature thermal diffusivities increased because the