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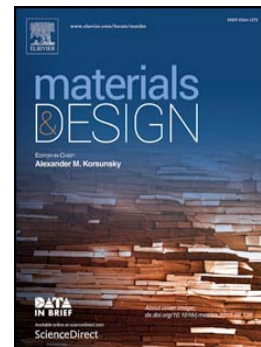
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Microstructure, texture and hardness of Al-Cu-Li alloy sheet during hot gas forming with integrated heat treatment

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Abstract: In this paper, hot gas forming with integrated heat treatment was carried out to investigate the microstructure and strengthening behavior of an Al-Cu-Li alloy sheet. The cup-shaped specimen was free bulged by compressed air within 3 sec after the sheet was heated at 520 °C for 30 min. The corresponding strengthening behavior was reflected by Vickers hardness measurement. Microstructure observation was conducted to reveal the deformation and strengthening mechanisms by using electron backscatter diffraction and transmission electron microscope techniques. It was found that the hardness in the undeformed area could arrive at 181 HV, which increased as deformation increased. Dynamic recovery occurred while the effective strain was 0.31. Dynamic recrystallization occurred with further increase in deformation, accompanying with grain fragmentation. The grains in {110}<112> orientation were produced gradually with increasing deformation. Precipitation strengthening was the main strengthening mechanism in the undeformed area, which could be enhanced by the deformation during hot gas forming. A high density of dislocations and low angle grain boundaries were produced in the deformed area, which accelerated more fine precipitates precipitating. Enhanced formability and hardness were obtained during rapid hot gas forming by combining with heat treatment.

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