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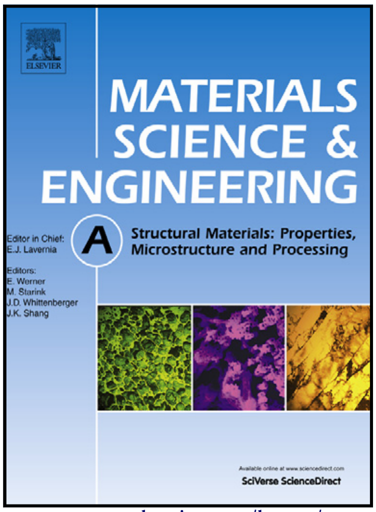

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A new dynamic recrystallization model of extruded Al-Cu-Li alloy during high temperature deformation

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Abstract

High temperature deformation behavior and microstructure evolution of an extruded Al-Cu-Li alloy were investigated by compression tests conducted at various temperatures (613, 673 and 733 K) with various strain rates (0.001, 0.01, and 0.1 s^{-1}). The results indicated the deformation activation energy increased from 208.7 KJ/mol to 255.7 KJ/mol with strain from 0.1 to 0.7. The electron backscatter diffraction maps showed dynamic recrystallization took place during high temperature deformation. Two kinds of recrystallization mechanisms, grain boundary bulging and grain boundary transformation from low misorientation to high misorientation, were considered to control the formation of recrystallized grains together. A new dynamic recrystallization model containing these two mechanisms is proposed to describe the microstructure evolution of extruded Al-Cu-Li alloy. At the early stage of deformation, recrystallized grains are formed by grain boundary bulging along the original grain boundaries. With the increase of strain, recrystallized grains are gradually generated in the deformed grains due to the transformation from low angle boundaries to high angle boundaries.

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