

عنوان مقاله:

A study on the sub-structure and mechanical properties of friction stir processed AA 6061-T6 joints with ultra-fine grained structure

محل انتشار:

فصلنامه مواد پیشرفته و فرآوری، دوره 2، شماره 1 (سال: 1393)

تعداد صفحات اصل مقاله: 14

نویسندگان:

.Ali Salemi Golezani - Department of Materials Engineering, Karaj Branch, Islamic Azad University, Karaj, Iran

M. Esmaily - Department of Chemical and Biological Engineering, Chalmers University of Technology, Göteborg, Sweden

.N. Mortazavi - Department of Applied Physics, Chalmers University of Technology, Göteborg, Sweden

خلاصه مقاله:

Ultra-fine grained (UFG) structure ($\sim 0.6 \mu\text{m}$) was produced in the stir zone (SZ) of 6061-T6 aluminum alloy joints using friction stir processing (FSP) cooled by liquid nitrogen (N_2). A new experimental set-up was used to simultaneously quench the lower and upper surfaces of the samples during the processing. In addition, FSPed joints, using a steel backing plate, were produced at room temperature as a reference. Sub-structural studies have been carried out to investigate the occurrence of dynamic recrystallization and grain growth in the weld area of the samples. The results indicate that the microstructure was not fully recrystallized as a high dislocation density ($3.5 \times 10^{14} \text{ m}^{-2}$) was measured in the stir zone (SZ) of rapidly cooled joints in compare with that of the air-cooled joints ($1.5 \times 10^{14} \text{ m}^{-2}$). Moreover, the rapid cooling generated a very high dislocation density of about $6.5 \times 10^{14} \text{ m}^{-2}$ in the thermo-mechanical affected zone (TMAZ). Accordingly, better mechanical properties were obtained in the SZ. In contrast, lower strain hardening capacity and hardening exponent values were obtained in the rapidly cooled joints where the highest fraction of low angle grain boundaries (LAGBs) and largest number of dislocations were measured.

کلمات کلیدی:

Friction stir wrocessing, Aluminum Alloy, sub-structural analysis, dislocation density

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1282660>

