

## عنوان مقاله:

Tribological Behavior of TiN/Al Nano-composite Surface Layer Fabricated by Friction Stir Processing

## محل انتشار:

دومین کنفرانس بین المللی کامپوزیت (سال: 1389)

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## خلاصه مقاله:

Friction Stir Processing using a hardened H-13 tool steel was employed to incorporate nano-sized TiN powder into 6061 Al substrate to form particulate composite surface layer. TiN/Al nano-composite surface layer was achieved by adjusting FSP process parameters such as tool rotational and substrate travel speeds. In the stirred zone, a homogeneous dispersion of nano-sized TiN particulate in a matrix of fine equiaxed grains was observed using scanning electron microscopy. The nano-sized ceramic particles could restrict grain boundary migration and limit the mean grain size of the surface composite layer. Vickers micro hardness testing results showed that the hardness value of the nano-composite surface layer is about three times of that of the un-treated substrate. In addition, dry tribological behavior of the un-treated substrate showed sever wear regime against hardened chromium steel using pin-on-disk testing. Contrary to this a relatively mild wear regime was exhibited by the nano-composite surface layer. Relatively thinner abrasion grooves and smaller pits were observed in the worn-out surface of the nano-composite layer than that of the substrate. The superior tribological behavior of the nanocomposite surface layer is attributed to its improved micro hardness value due to the presence of hard TiN particles and grain refinement.

## کلمات کلیدی:

Friction stir processing, Tribology, Nano-composite, Al, TiN

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