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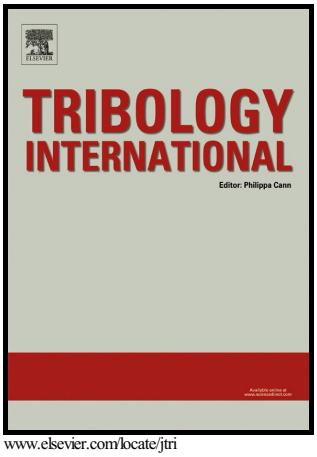

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Enhanced strength and wear resistance of a titanium-oxygen alloy with core-shell network structure

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Abstract:

An enhanced sliding wear resistance of a novel core-shell Ti-O (CS-TiO) structured alloy combined with superior compressive properties relative to a commercial pure Ti (CP-Ti) compact is reported. The wear volume, area fraction of transfer layer in the contact zone and O content on the worn scars ($O_{at.\%}$) were determined under various conditions. For CS-TiO, the prominent enhancement in wear resistance by more than 2 times is related to the increased $O_{at.\%}$ and improved yield strength, from 420 MPa in CP-Ti to 1210 MPa, which can effectively prevent it from experiencing serious adhesion and plastic deformation respectively. The study opens a new sight for microstructural design of anti-wear Ti alloys and composites: promoting tribo-oxidation reaction as well as improving strength.

Keywords: Transfer; Abrasive; Adhesive; Wear

1. Introduction