

Materials Chemistry and Physics, November 2024

Comparison study on the effect of oxygen, nitrogen and hydrogen absorption on phase transformation and mechanical properties of quenched CP Ti and Ti6Al4V alloy

Mguni, N; Mathabathe, Maria N; Shongwe, MB; Bolokang, Amogelang S

**Abstract**

Microstructures and mechanical properties of commercial pure Ti and Ti6Al4V metal were studied after water quenching. The nitrogen (N), oxygen (O) and hydrogen (H) analysis was conducted on the quenched samples to establish the effect of impurities on phase transformation and mechanical properties. It was found that despite some negligible increment on the impurities, they could not be attributed to structural change but rather stabilization of the metastable FCC induced by rapid cooling. The formation of the metastable FCC phases was attributed to stresses induced by high cooling rates upon water quenching. Quenching from high temperatures has a significant effect on the crystal structure, microstructure and mechanical properties.