

18th International Conference and Exhibition on

MATERIALS SCIENCE AND ENGINEERING

May 28-30, 2018 Osaka, Japan

Spark plasma semi-solid sintering: Bimodally grained high yield strength and ductility Ti-based alloys based on the eutectic transformation

Limei Kang

South China University of Technology, China

Scientific workers have paid close attention to bimodal or multimodal microstructure in the pursuit of an excellent combination of high strength and large ductility for metal and alloy. Then various important strategies have been developed to achieve different length scales titanium alloys for the past few years. This study will provide an innovative new idea to fabricate bimodal microstructure based eutectic reaction, which can give some inspiration for fabricating better fascinating combinations of properties in metallic alloys. By designing phase proportion of eutectic reaction or the content of eutectic reaction induced liquid phase, bimodal microstructure was successfully prepared by mechanically milling quinary Ti-Nb-Fe-Co-Al powder and subsequent spark plasma semisolid sintering. The bulk alloy exhibits a novel bimodal microstructure composed of an ultrafine lamellar and ellipsoid eutectic (from 150 nm to 1 μ m) and micron sized (\sim 5 μ m) minor phase embed in the eutectic matrix, which differs from all the reported literatures so far. As sintered bulk alloy exhibits a high strength of 2897 MPa with 23% ductility; especially yield strength up to 2050 MPa, which is superior to the published values of equivalent materials so far. This unusual combination of strength and ductility is attributed to a mechanism that involves the blocking, branching and multiplication of the bcc β -Ti lamellae and the interactions with dislocations in the bcc Ti (Fe, Co) lamellae as well as on the stability of a coherent interface. The novel idea provides some inspiration for fabricating nanograin or bimodal microstructure with better fascinating combinations of properties in high melting point alloy systems by spark plasma sintering.

Biography

Limei Kang has completed her PhD from South China University of Technology. Currently, she is pursuing postdoctoral fellowship in Guangdong University of Technology. She has published more than 9 papers in reputed journals.

454583141@qq.com

Notes: