

CHARACTERIZATION OF MICROSTRUCTURE AND OXIDATION RESISTANCE OF Y AND GE MODIFIED SILICIDE COATING ON Nb-Si BASED ALLOY

Chungen Zhou, Beihang University
cgzhou@buaa.edu.cn
lijing Zheng, Beihang University
Huarui Zhang, Beihang University

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Y and Ge modified silicide coating was prepared on the Nb-Si based alloy by Si-Ge-Y co-deposition at 1300°C for 10h. The coating consists of an outer layer and a transitional layer(Fig.1a). The outer layer is consist of $(Nb, X)(Si, Ge)_2$ (X represents Ti, Cr, Ge and Hf elements) and the transitional layer is composed of $(Nb, X)_5(Si, Ge)_3$. The mass gain of the coated specimen is 2.78 mg cm^{-2} after oxidation at 1250 °C for 100 h(Fig.1b), which reveals that Ge and Y modified silicide coating exhibits better oxidation resistance than Ge-modified silicide coating and Y element is significantly beneficial for the oxidation resistance. The results indicate that Y refines grain size due to the formation of $Y_3Al_5O_{12}$ particles at grain boundaries, which could promote the rapid formation of protective SiO_2 and GeO_2 scale, and then oxygen diffusion could be decreased. Therefore, the oxidation resistance of the coating is improved.

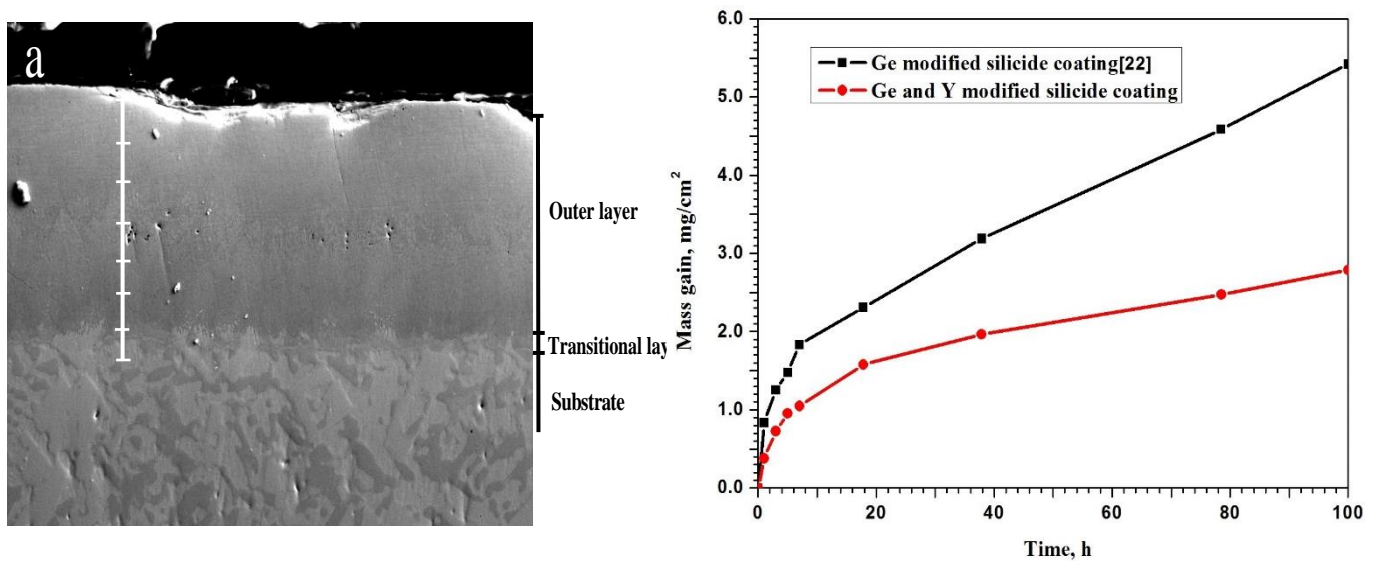


Figure 1. (a) Cross-sectional EPMA image; (b) The oxidation kinetics of Si-Ge and Si-Ge-Y coatings after oxidation at 1250 °C for 100 h