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HIGH TEMPERATURE MECHANICAL PROPERTIES OF Ni-BASE SUPPERALLOY AND DIFFUSION ALUMINIDE BOND COATING: AN *IN SITU* SEM NANOINDENTATION STUDY

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High-strength structural materials such as Ni-based superalloys and diffusion bond coats are widely used in challenging environments and with exposure to mechanical fatigue, particle impact, and erosion at elevated temperatures. Diffusion aluminide bond coats are an example of compositionally and microstructurally graded coatings with significant variation in engineered mechanical properties across the cross-section. Nanoindentation, particularly *in situ*, can be considered as a well-suited technique for measuring the properties of such complex microstructural materials as the deformation volume can be carefully controlled to probe different precipitates and microstructural zones. In this study, an SEM nanomechanical instrument, PicoIndenter 87xR, with an integrated high-temperature stage and an active tip heating was used to conduct nanoindentation on the cross-section of substrate and aluminide bond coating at room temperature, 200°C, 400°C, 600°C, and 800°C. With combined analysis of chemistry and microstructural changes, the indentation results are used to understand local mechanical properties variation as a function of temperature.