NANOINDENTATION AT ELEVATED TEMPERATURES

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Relating the creep response observed with high temperature instrumented indentation experiments to macroscopic uniaxial creep response is of great practical value. In this review, we present an overview of various methods currently being used to measure creep at small scales with instrumented indentation, with a focus on geometrically self-similar indenters, and their relative merits and demerits from an experimental perspective. A comparison of the various methods to use those instrumented indentation results to predict the uniaxial power law creep response of a wide range of materials (stress exponent of 1 to 8), will be presented to assess their validity. The interplay of size dependent hardness effects, strain rate effects and temperature effects will also be discussed. The extension of rapid testing and mapping techniques to high temperatures will also be demonstrated. Figure 1 shows a map of hardness vs position in a carbide containing steel at 300 degrees C. These techniques are extended to stress exponent and pre-exponential maps determined at high temperatures.

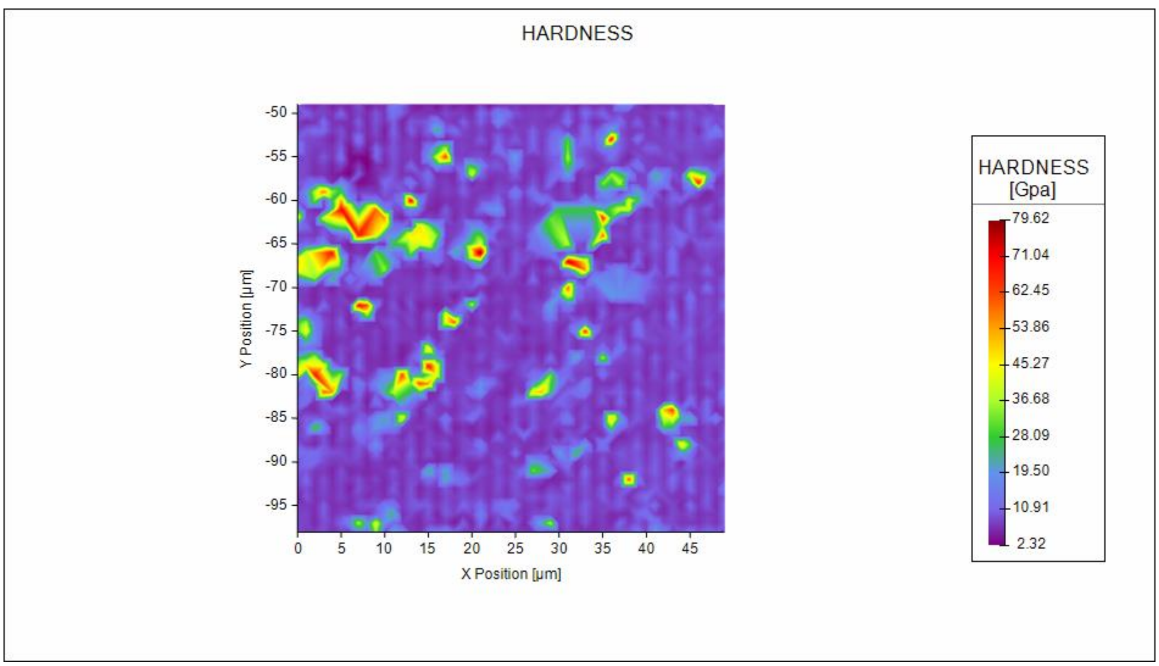

Figure 1. Hardness vs position in a carbide containing steel at 300 degrees C.