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[205] Nanoindentation in ZrO₂ ceramics –pitfalls and consequences

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Nanoindentation has become a popular method for determining Young's Modulus (E) of materials. Though for most materials this method has been successfully applied, significant errors of the results can occur if materials respond unfavorably to standard indentation parameters. This paper presents an investigation of the effects of nanoindentation on Yttria-stabilized Zirconia compared to bulk properties obtained from Resonant Ultrasound Spectroscopy. We not only observed different results for each method, but also a significant change of E with indentation depth. Analysis of the indents with Raman spectroscopy revealed an indentation-induced phase transformation in the material. In conclusion, researchers should therefore be careful when choosing their method of determining E .

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