

Fall 10-4-2015

# An Improved Method for Point Deflection Measurements on Rectangular Membranes

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## Recommended Citation

Benoit Merle, Kyle Nicholson, Erik Herbert, and Mathias Goken, "An Improved Method for Point Deflection Measurements on Rectangular Membranes" in "Nanomechanical Testing in Materials Research and Development V", Dr. Marc Legros, CEMES-CNRS, France Eds, ECI Symposium Series, (2015). [http://dc.engconfintl.org/nanomechtest\\_v/84](http://dc.engconfintl.org/nanomechtest_v/84)

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## **An Improved Method for Point Deflection Measurements on Rectangular Membranes**

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Key Words: Thin Films, Residual Stress, Bulge Test

The point deflection method has recently emerged as a possible alternative to current micromechanical techniques for measuring the mechanical properties of thin films. A point deflection experiment consists into deflecting a clamped membrane in its center with a nanoindenter tip. The widespread availability of the required equipment makes the method very promising for future applications. These outlooks were further enhanced by the recent extension of the evaluation theory to rectangular membranes, which – unlike circular ones – are easily fabricated by standard lithographic techniques.

In this work, the recent theoretical advances were critically reviewed and an improved experimental method based on the measurement of the contact stiffness was implemented. The new method was applied to the measurement of the residual stress of 100-nm thick SiNx and TiO<sub>2</sub> membranes. The accuracy of the point deflection experiments was assessed by testing the same samples a second time with the bulge test reference technique. It is shown that the new experimental method dramatically improves the reproducibility of the measurements, and suggestions are made to improve the current evaluation scheme.