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## Measuring the contact area by SPM imaging

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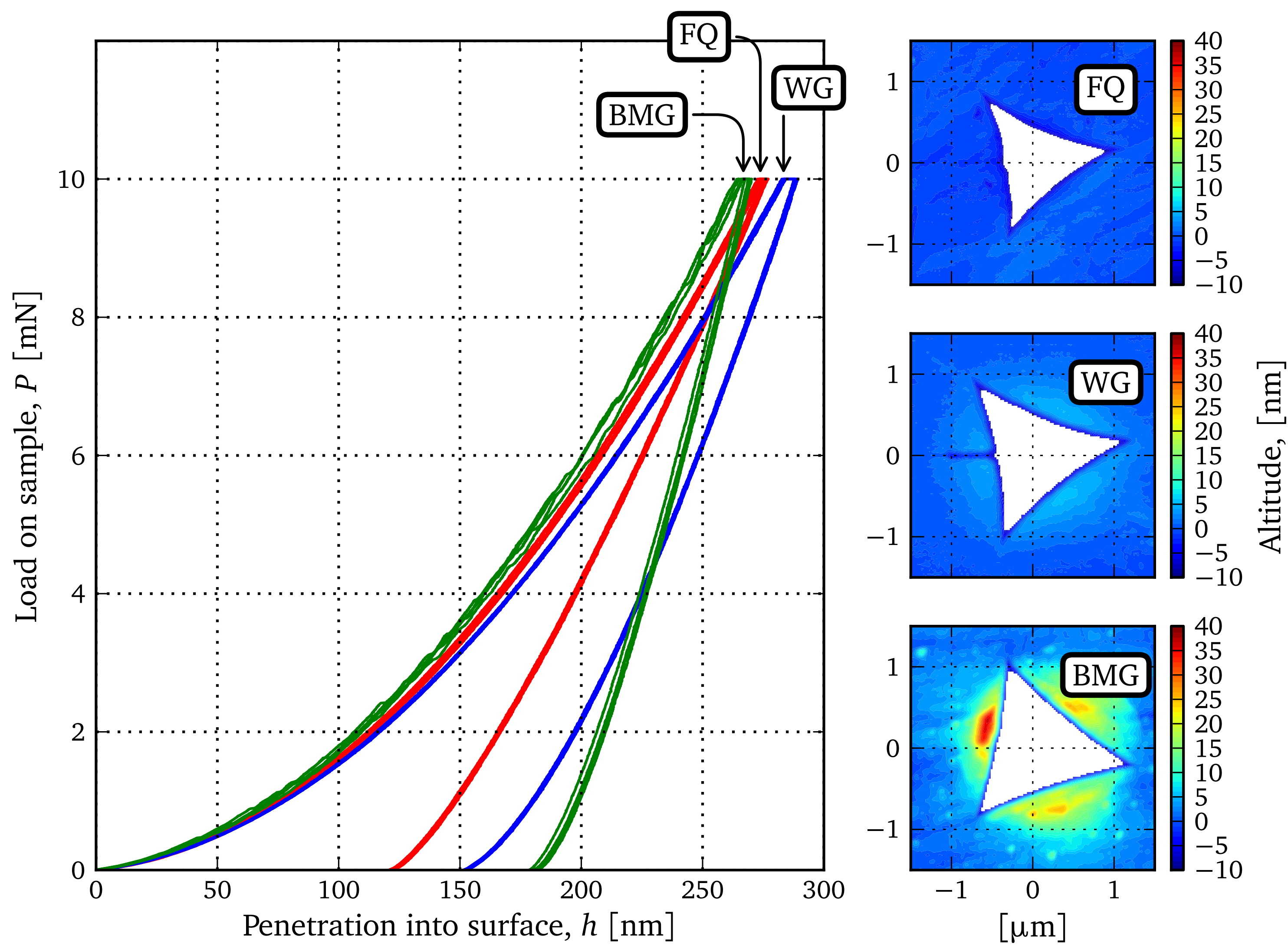


# Measuring the contact area by SPM imaging

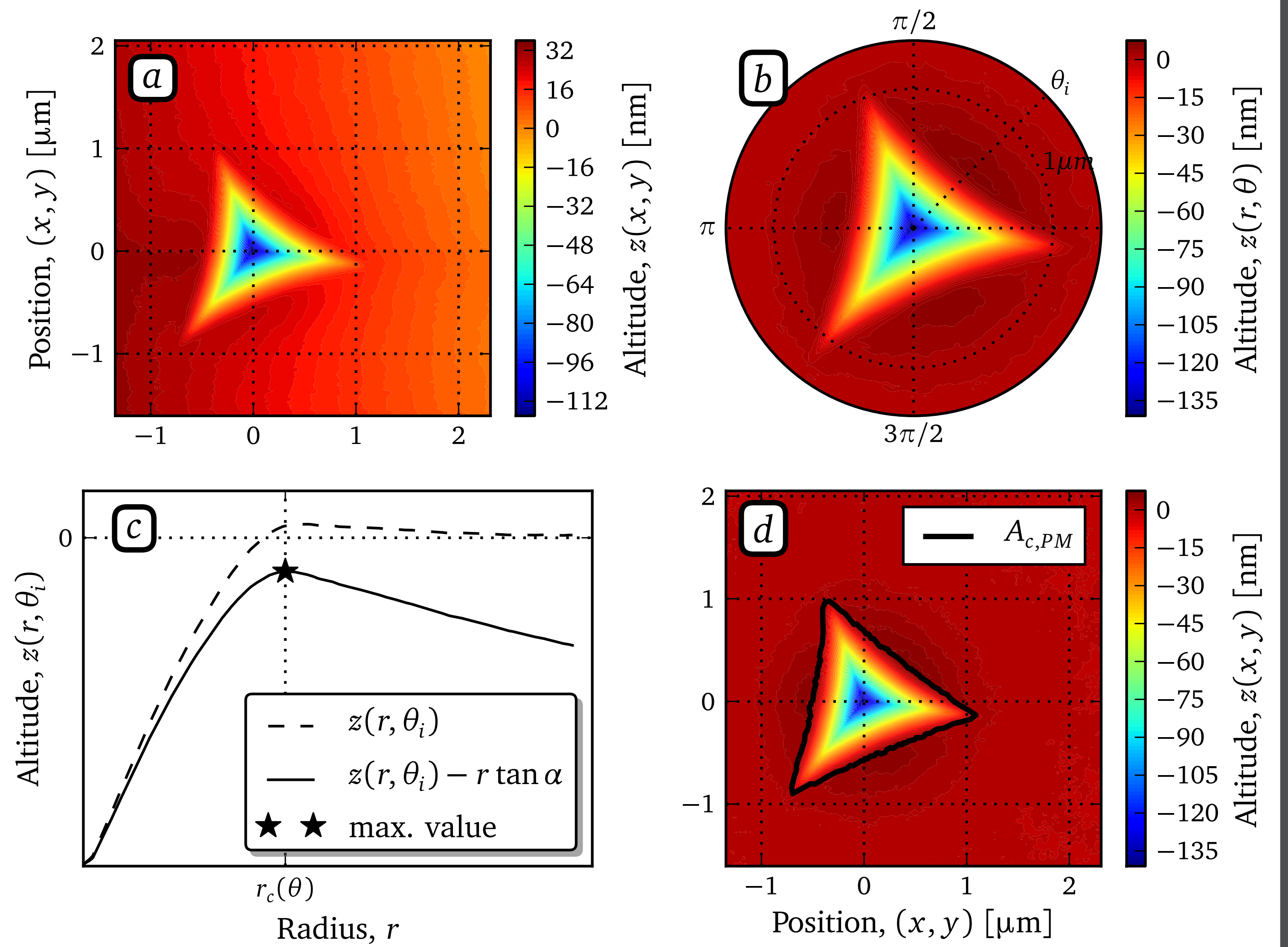
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## Indentation + SPM imaging

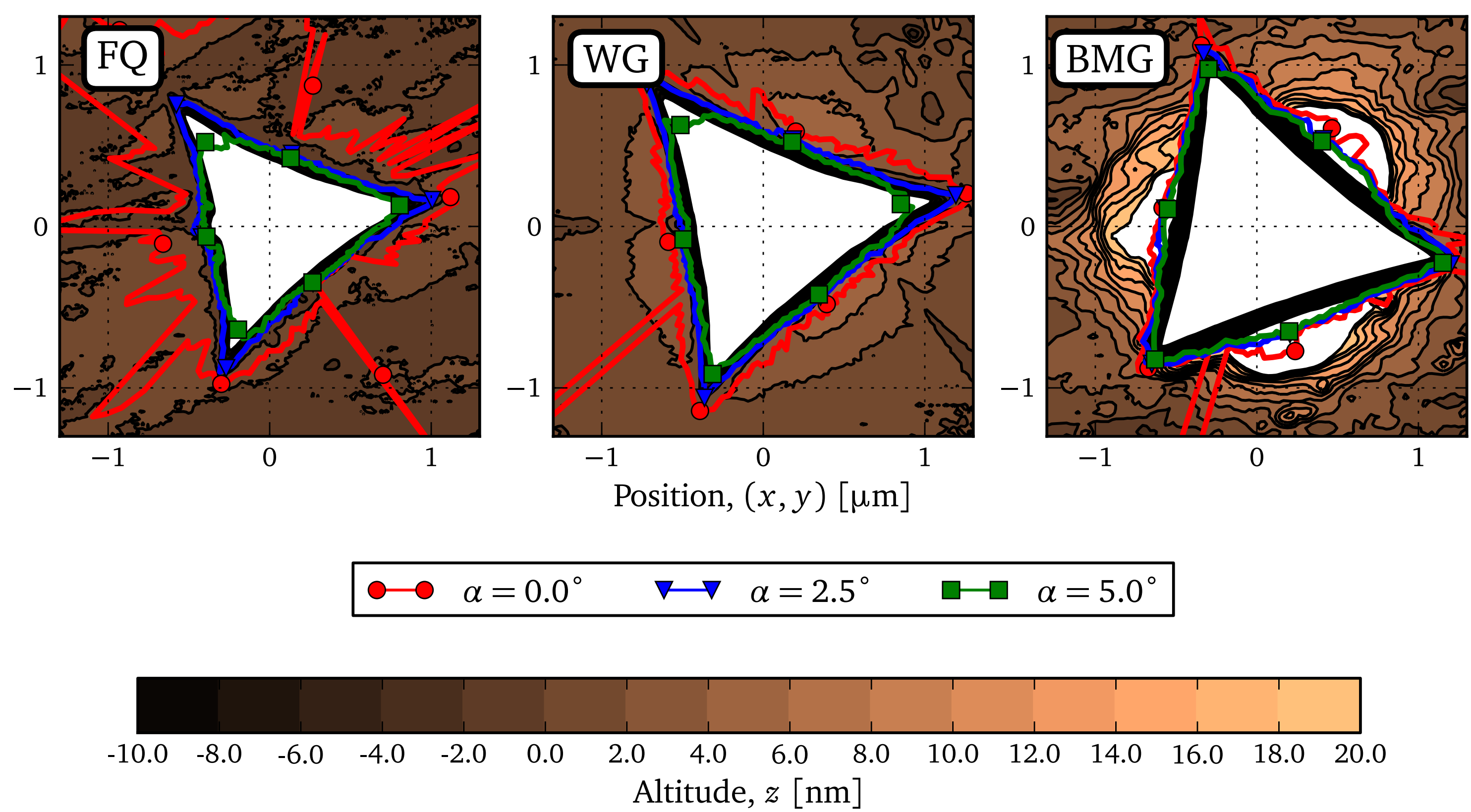


## Measuring the contact area $A_c$



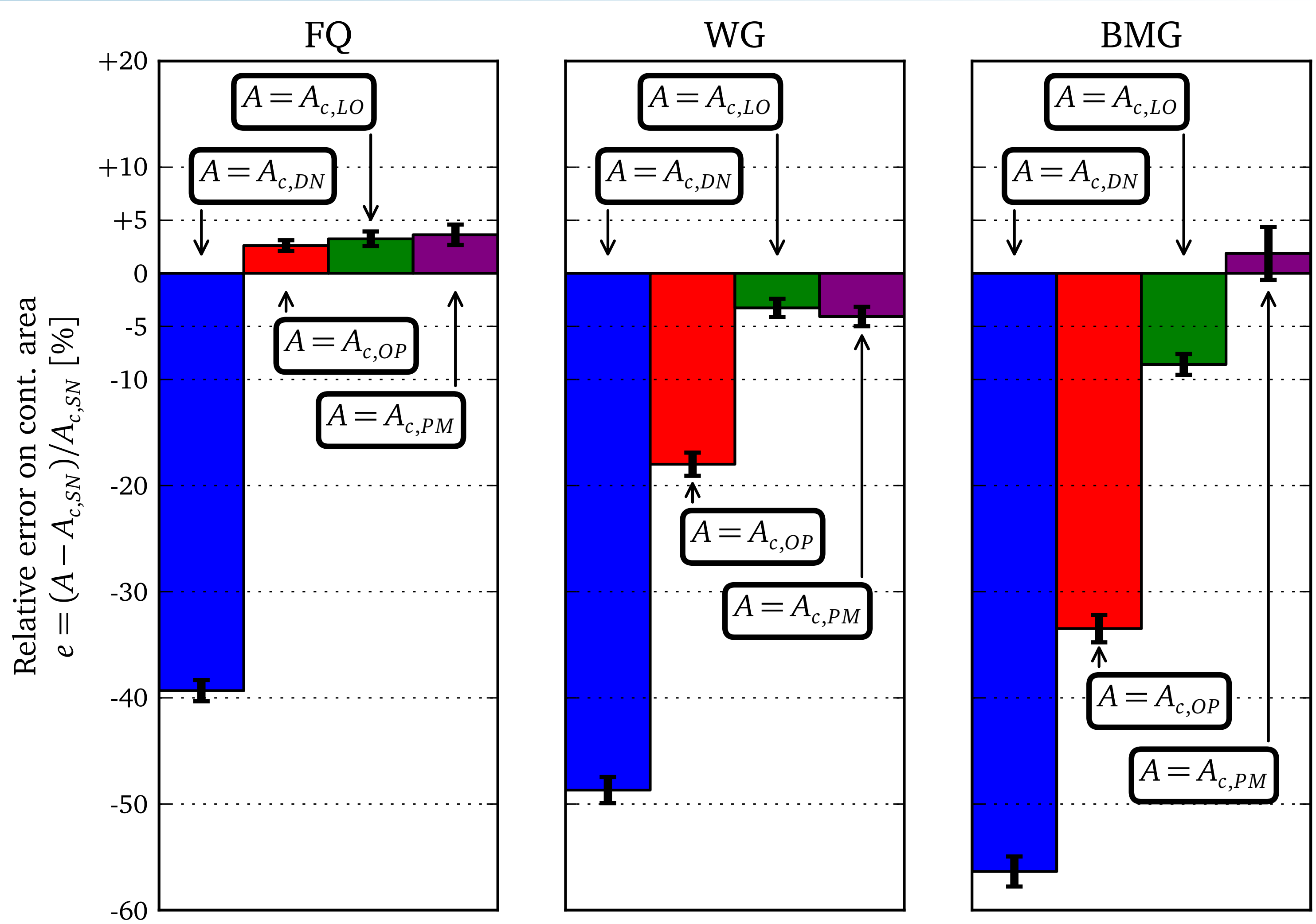
Each cross section is tilted by  $\alpha$

## The role of $\alpha$



Best choice:  $\alpha = 2.5^\circ$

## Experimental benchmark

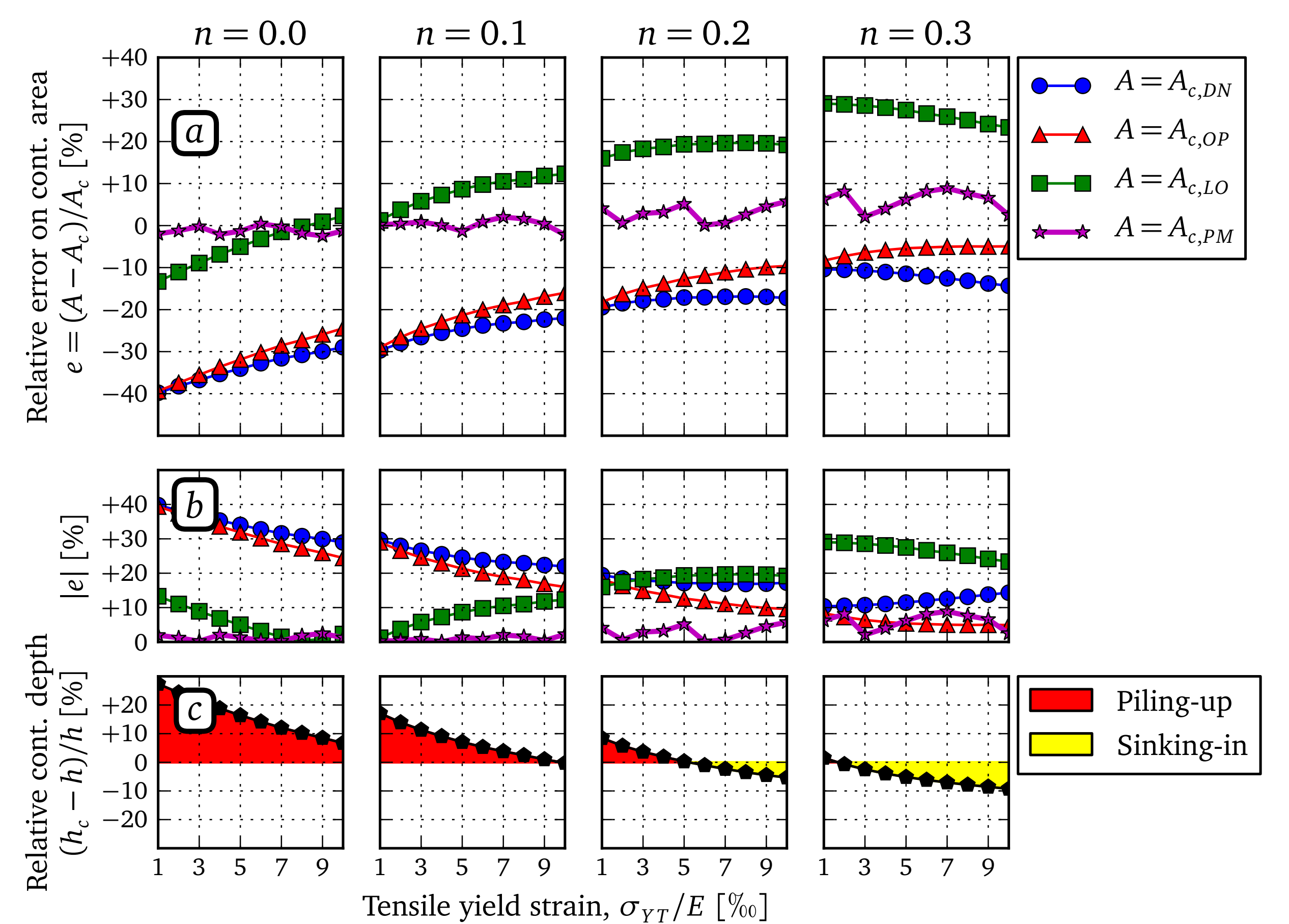


## References

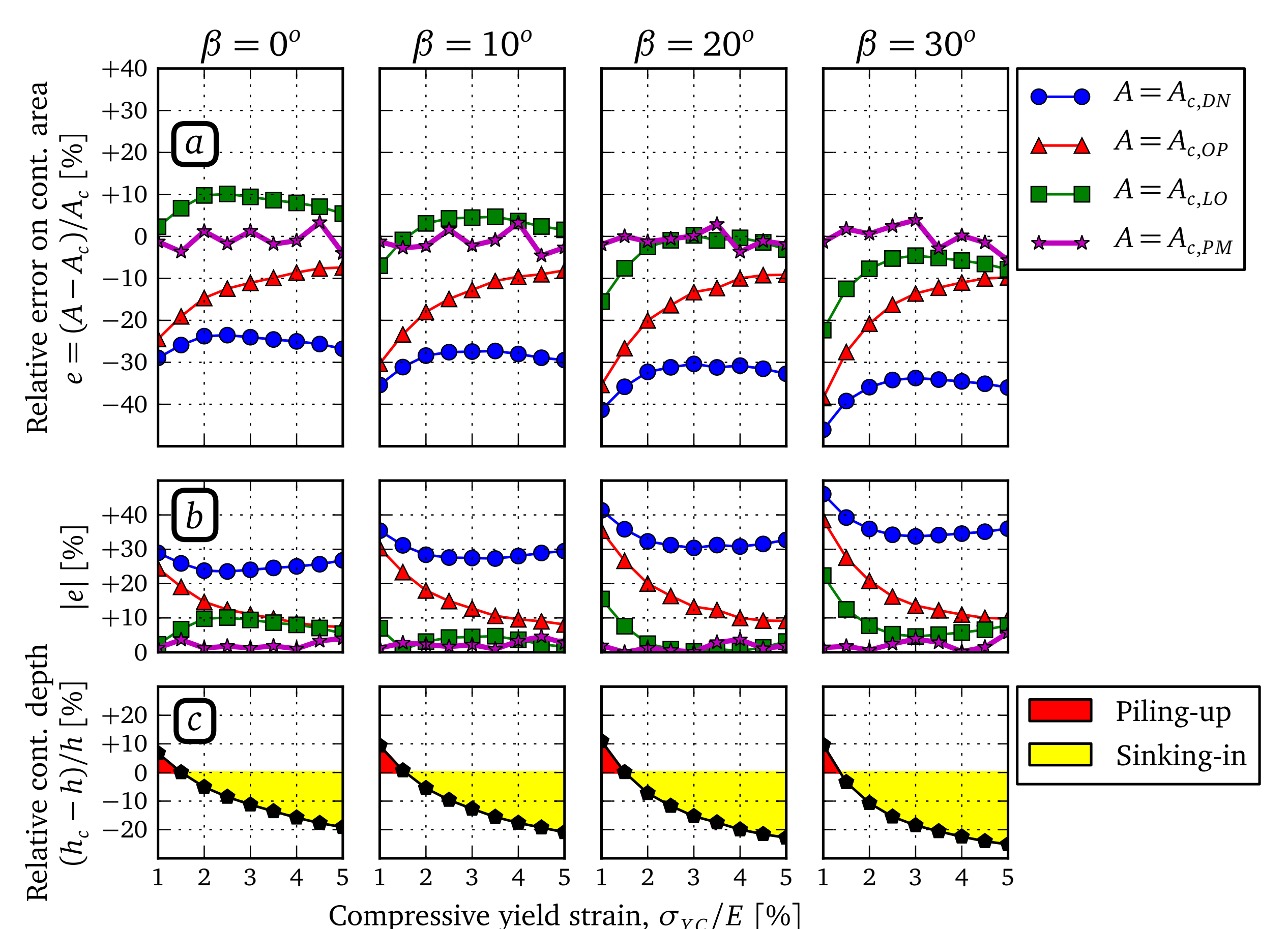
- <https://github.com/lcharleux/spym>
- L. Charleux, V. Keryvin, M. Nivard, J.-P. Guin, J.-C. Sangleboeuf, and Y. Yokoyama, "A method for measuring the contact area in instrumented indentation testing by tip scanning probe microscopy imaging" Acta Mater., vol. 70, pp. 249–258, 2014.

## Numerical benchmark

Hollomon: metallic alloys, power law hardening



Drucker Prager: metallic glasses, pressure sensitivity



- DN : M. F. Doerner and W. D. Nix, "A method for interpreting the data from depth-sensing indentation instruments" J. Mater. Res., vol. 1, no. 04, pp. 601–609, 1986.
- OP : W. C. Oliver and G. M. Pharr, "An improved technique for determining hardness and elastic modulus using load and displacement sensing indentation," J. Mater. Res., vol. 7, no. 6, pp. 1564–1583, 1992.
- LO : [J. L. Loubet, J. M. Georges, O. Marchesini, and G. Meille, "Vickers Indentation Curves of Magnesium Oxide (MgO)," J. Tribol., vol. 106, no. 1, p. 43, 1984.