

THE EFFECTS OF CAPILLARY FORCE IN MICRO OR NANO-INDENTATION

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ABSTRACT

Models describing wet adhesion between indenters and substrates joined by liquid bridges are investigated. The influences of indenter shapes and various parameters of structures on capillary force are focused. In the former, we consider several shapes, such as conical, spherical and truncated conical indenter with a spherical end. In the latter, the effects of the contact angle, the environmental humidity, the gap between the indenter and the substrate, etc. are included. Different dependences of the capillary force on the indenter shapes and the geometric parameters are observed. Most interesting finding is that applying the present results to micro- and nano-indentation experiments shows the size effect in indentation hardness not produced but underestimated by the effects of capillary force.

Key Words: capillary force; micro- and nano-indentation; indenter shape; humidity

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