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Evidence for Capillary Contributions to Gecko Adhesion from Single Spatula Nanomechanical Measurements GERRIT HUBER, STANISLAV GORB, EDUARD ARZT, Max Planck Institute for Metals Research, Heisenbergstrasse 3, D-70569 Stuttgart, Germany, RALPH SPOLENAK, ETH Zurich, Laboratory for Nanometallurgy, Department of Materials, CH-8093 Zurich, Switzerland, KLAUS MECKE, Erlangen University, Dept. of Theoretical Physics, D-91058 Erlangen, Germany, HUBERT MANTZ, KARIN JACOBS, Saarland University, Dept. of Experimental Physics, D-66041 Saarbruecken, Germany — The hairy attachment system on a gecko's toes, consisting of one billion spatulae in the case of *Gekko gekko* allows it to adhere to nearly all surface topographies. The mechanistic basis for gecko adhesion has been intensely investigated, but the lowest hierarchical level, that of the spatula, has become experimentally accessible only recently. This study details measurements of the adhesion force exerted by a single gecko spatula for various atmospheric conditions and surface chemistries. Through judicious choice and modification of substrates, the short- and long-range adhesive forces are separated. In contrast to previous work, our measurements clearly show that humidity contributes significantly to gecko adhesion on a nanoscopic level. These findings are crucial for the development of artificial biomimetic attachment systems.

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