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Formation of a Metallic Contact: Jump to Contact Revisited. C. UNTIEDT, M.J. CATURLA, M.R. CALVO, J.J. PALACIOS, Departamento de Fisica Aplicada, Universidad de Alicante, E-03690 Alicante, Spain, R.C. SEGERS, J.M. VAN RUITENBEEK, Kamerlingh Onnes Laboratorium, Leiden University, PO box 9504, NL-2300 RA Leiden The Netherlands — The process of adhesion between two metallic surfaces has been described so far as involving an instability leading to a jump from tunneling into contact[1,2]. In the last decade some experiments have shown that this is not always the case, and sometimes the transition from tunnelling to metallic contact goes smoothly[3-5]. We have observed that the configuration and material composition of the electrodes before contacts largely determines the presence or absence of a jump. Moreover, when jumps are found preferential values of conductance have been identified. Through combination of experiments, molecular dynamics, and first-principles transport calculations these conductance values are identified with atomic contacts of either monomers, dimmers or double-bond contacts. These results provide basic understanding of fundamental interactions between surfaces at the nanoscale. [1]N. Agrait, et al. Phys. Rep **377**,81 (2003) [2]U. Landman et al. Science **248**, 454 (1990) [3]G. Cross et al. Phys. Rev. Lett. **80**, 4685 (1998) [4]A. Halbritter et al. Phys. Rev. B. **68**, 035417 (2003) [5]L. Limot et al. Phys. Rev. Lett. **94**, 126102 (2005).

Carlos Untiedt
Departamento de Fisica Aplicada, Universidad de Alicante,
E-03690 Alicante, Spain

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