Real time atomic force microscopy imaging for n ano contact fabrication by electromigration

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In the two last decades, the fabrication of nanoscale gaps between two metallic electrodes has received considerable attention because of their application in the electrical characterization of molecules and nanometer scale objects [1–3]. A large number of ingenious techniques have been developed to fabricate such devices [4]. Among them, techniques relying on the breaking of a metallic nanowire are the most widely used. The breaking can be initiated by either a mechanical strain, in mechanical break junctions, or an electrical current, in electromigrated devices [1]. Electromigration relies on large current densities and momentum transfer from electrons to atoms to break a thin and narrow metallic wire. The electromigration method offers unique opportunities for integration in complex devices (transistor-like with agate, multiple nanogaps…) but still suffers from poor control and reproducibility of the electromigration process. In order to get more insight into the electromigration process and to achieve a better control of nanogaps, imaging the nanowire structure during the nanogap formation is essential. We will present here real time atomic force microscopy imaging during nanogap fabrication by feedback controlled electromigration of a gold nanowire (Figure 1).

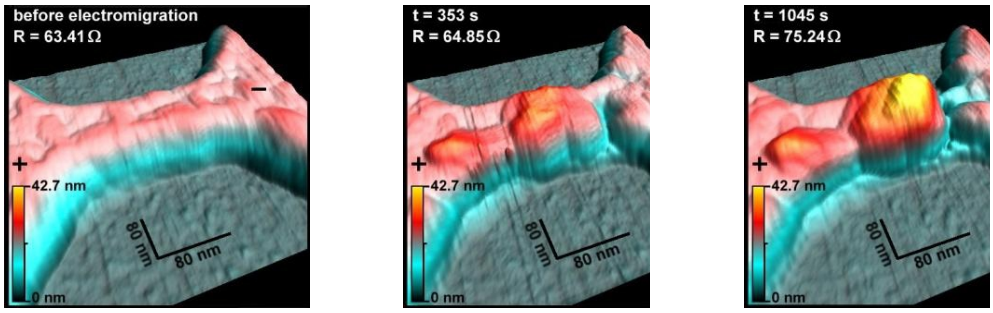

Figure 1: Atomic force microscope images at 3 different stages of the electromigration process of a gold nanowire.

References

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