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Movies of Electromigration During the Formation of Break Junctions THITI TAYCHATANAPAT, K. I. BOLOTIN, F. KUEMMETH, D. C. RALPH, LASSP, Cornell University, Ithaca, NY 14853 — Breaking metal wires by electromigration is a useful technique for making contacts for single-molecule devices. However, some research groups have found that a high percentage of gaps formed during electromigration (10-30%) can contain metal nanoparticles which produce artifacts in the device's electrical characteristics that might be mistaken for molecular signals. Other groups, using slightly different electromigration protocols, observe these artifacts at much lower rates. Here we investigate this issue by examining the electromigration process in real-time using a scanning electron microscope. We provide direct confirmation for arguments that the amount of series resistance in the electromigration circuit is a critical parameter in controlling whether nanoparticles are formed within the device. By observing devices to which metal nanoparticles have been attached using linker molecules, we are also able to estimate the effective temperature experienced by molecular adsorbates during electromigration.

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