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**Automatic Atomic/Molecular Assembly and Atom Sound** TIMUR SKEINI, KAI-FELIX BRAUN, SAW-WAI HLA, Nanoscale & Quantum Phenomena Institute, Physics & Astronomy Dept., Ohio University, Athens, OH 45701 — We report the development of an automation scheme for single atom/molecule assembly on metallic surfaces using scanning tunneling microscope (STM) tip. Our real time computer control scheme automatically identifies the type of objects (atoms/molecules) to be moved, calculates the STM-tip movement path by avoiding obstacles such as steps/defects and then actually moves the atom/molecule to the desired locations on the surface to form engineered patterns using STM lateral manipulation technique (1,2,3). During the manipulation process, the STM tip-height is initially reduced above the atom/molecule in order to increase the tip-atom/molecule interactions, and then the tip is moved along a computed path across the surface. The atom/molecule moves in a discontinuous manner by hopping between the surface sites. Moreover, the atom/molecule sounds can be generated from the manipulation signals, which further reveal the dynamics of atom/molecule movements during the manipulation processes. (1). S.-W. Hla, K.-F. Braun, V. Iancu, A. Deshpande, Nano Lett. 4 (2004) 1997-2001. (2). S.-W. Hla, K.-F. Braun, K.-H. Rieder, Phys. Rev. B 67 (2003) 201402(R). (3). J.A. Stroscio and R.J. Celotta, unpublished work. This work is financially supported by the NSF-NIRT grant no. DMR- 0304314 and the US-DOE grant no. DE-FG02-02ER46012.

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