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AFM local oxidation nanolithography of graphene LISHAN WENG, LIYUAN ZHANG, YONG P. CHEN, LEONID P. ROKHINSON, Purdue University — We demonstrate the local oxidation nanopatterning of graphene films by an atomic force microscope. The technique provides a method to form insulating trenches in graphene flakes and to fabricate nanodevices with sub-nanometer precision. By utilizing this technique, a 25-nm-wide nanoribbon and submicron size nanoring were fabricated from a graphene flake. In addition we found that either trenches or bumps can be written on the graphene surface depending on the lithography conditions. It is proposed that the trenches are created by defect-associated oxidation whereas the bumps are incorporation of oxygen into the graphene lattice. Some of the bumps disappear with time as quickly as in a few minutes or as slow as in a few days. We also further investigate the possibility to remove the bumps in a controllable manner by writing trenches on top, applying opposite voltage or change the environmental conditions.

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