Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Preparation of graphene nano-meshes and nano-ribbons using block copolymer lithography ZHIWEI SUN, THOMAS RUSSELL, University of Massachusetts Amherst — Graphene nano-ribbons and nano-meshes can find diverse applications in next generation electronic devices and energy technology, e.g. preparation of field-effect transistors and solar cell devices. Here, a facile way was proposed to prepare graphene nano-meshes and nano-ribbons with reactive ion etching (RIE) using microphase separated poly(styrene-b-2-vinylpyridine) (S2VP) thin film as template. Cylinder forming S2VP thin film was spin-casted on top of graphene sheets on silicon wafer, which was prepared via chemical vapor deposition (CVD) on copper film. Cylinders in S2VP thin film would be aligned parallel to graphene substrate when exposed to THF vapor, while perpendicular to substrate when exposed to chloroform vapor. S2VP covered graphene films were then surface reconstructed in ethanol to enhance the etching contrast, followed by oxygen plasma reactive ion etching (O_2-RIE). Block copolymer nano-patterns were successfully transferred to graphene films at appropriate etching conditions, and graphene nano-ribbons and nano-meshes were formed. In addition, size and density of nano-cavities on graphene were fine-tuned by changing molecular weight and chemical composition of the S2VP template.

Zhiwei Sun
University of Massachusetts Amherst

Date submitted: 12 Nov 2013 Electronic form version 1.4