Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Novel fabrication process for all-MgB_2 Josephson junctions and circuits[1] THOMAS MELBOURNE, ELIAS GALAN, XIAOXING XI, KE CHEN, Temple University — A novel process for fabricating high-quality MgB_2/MgO/MgB_2 Josephson junctions and circuits is reported. A 100 nm-thick bottom electrode of MgB_2 was grown on SiC (0001) substrate by hybrid physical-chemical vapor deposition (HPCVD) and then coated by a $1 \sim 5$ nm-thick MgO junction barrier layer and a 20 nm-thick TiO_2 protection layer. After the bottom MgB_2 layer was patterned an 80 nm-thick MgO etch-stop layer was then deposited on the sample with a pattern created by photo- or e-beam lithography and lift-off, followed by reactive ion etching in SF_6 to remove TiO_2 from the Josephson junction areas. Finally, a 100 nm-thick MgB_2 serving as both the top electrode and wiring layer was deposited and patterned by photolithography and ion mill. The advantage over previously reported process is that this process combines the MgB_2 top electrode and the wiring layer, which simplifies fabrication and allows for an additional layer of MgB_2 to be dedicated to a ground plane in circuits. Characteristics of all-MgB_2 Josephson junctions fabricated by this process are shown.

[1]This work is supported by the U.S Office of Naval Research under grant N00014130052.

Thomas Melbourne
Temple University

Date submitted: 14 Nov 2014 Electronic form version 1.4