

Abstract Submitted  
for the GEC15 Meeting of  
The American Physical Society

**New Method for Production of High-Energy Neutral Molecules of Reactive Gases**<sup>1</sup> ALEXANDER METEL, VASILY BOLBUKOV, MARINA VOLOSOVA, SERGEI GRIGORIEV, YURY MELNIK, Moscow State University of Technology “STANKIN” — For the surface modification of dielectric substrates by reactive gas molecules with energy of 100 keV they are usually produced due to charge exchange collisions of ions extracted from a plasma emitter and accelerated by high-voltage pulses. As generation of the ion plasma emitter at a 100-kV potential is quite difficult, it was proposed to extract the ions from a ground potential emitter, accelerate them by high voltage between the emitter and a negatively biased high-transparency grid and transform them into fast neutral molecules in the positive space charge sheaths of the grid. As the energy of fast molecules is defined by potentials of charge exchange collision points inside the sheath their spectrum ranges from zero to a value corresponding to the pulse amplitude. A reverse beam is always generated due to acceleration of ions from the plasma on the other side of the grid. The lower the latter density, the higher the ratio of the primary to the reverse beam currents. When the grid is composed of parallel flat plates, the charge exchange due to reflections from the plates substantially contributes at low gas pressure to production of molecules with the energy corresponding to the pulse amplitude.

<sup>1</sup>The work was supported by the grant No. 14-29-00297 of the Russian Science Foundation.

Alexander Metel  
Moscow State University of Technology “STANKIN”

Date submitted: 05 Jun 2015

Electronic form version 1.4