Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Oscillatory behavior of the surface reduction process of multilayer graphene oxide at room temperature[1] DMITRY VOYLOV, Univ of Tennessee, Knoxville, ILIA IVANOV, Oak Ridge National Laboratory, VALERII BYKOV, Emanuel Institute of Biochemical Physics RAS, SVETLANA TSYBENOVA, Moscow City Teacher Training University, IGOR MERKULOV, Oak Ridge National Laboratory, SERGEI KUROCHKIN, Institute of Problems of Chemical Physics RAS, ADAM HOLT, Univ of Tennessee, Knoxville, ALEXANDR KISLIUK, Oak Ridge National Laboratory — The graphene oxide (GO) is one of 2D materials which continues to be studied intensively since it is thought can be used as a precursor of graphene. Recently, it was found that the chemical composition of multilayer GO is metastable on the time scale of one month even at room temperature. The observed changes in chemical composition were attributed to a reduction process controlled by the in-plane diffusion of functional groups which progresses through radical reactions. Here we report the observation of oscillatory oxidation-reduction (redox) reactions on the surface of multilayer GO films at room temperature. The redox reactions exhibited dampened oscillatory behavior with a period of about 5 days and found to be dependent on the time elapsed from GO deposition. The kinetic behavior of the processes and observed metastability of the surface functional groups are adequately described by two models involving reactions between functional groups of GO and reactant diffusion.

[1]US team acknowledges partial financial support from the Division of Materials Science and Engineering, U.S. Department of Energy, Office of Basic Energy Sciences.

Dmitry Voylov
Univ of Tennessee, Knoxville

Date submitted: 01 Dec 2015 Electronic form version 1.4