J Material Sci Eng 2013, 2:4
http://dx.doi.org/10.4172/2169-0022.S1.012

OMICS Group Conferences
Accelerating Scientific Discovery
2nd International Conference and Exhibition on
Materials Science & Engineering
October 07-09, 2013 Hampton Inn Tropicana, Las Vegas, NV, USA

Kinetics for the chemistry, biology, medicine and agriculture

G. E. Zaikov
N. M. Emanuel Institute of Biochemical Physics, Russian Academy of Sciences, Russia

Introduction: Kinetics is powerful and fine instrument in investigations of chemical, biochemical and biological processes, as well as in medicine, agriculture, etc.

This report will present examples how kinetics helps in solving many fundamental and applied tasks due to research-development-production principle (according to data of Institutes of Chemical Physics and Biochemical Physics, Russian Academy of Sciences).

Chemistry

1. Making of artificial diamonds from compounds having no carbon
2. Development of highly sensitive methods of investigation of chemical reactions (chemiluminescence) and analysis of reaction products (for example, determination of a one double bond in a carbochain polymer and its location against 50000 single bonds)
3. Multitonnage chemical production design (production of acetic acid and methylethylketone by oxidation of n-butane in liquid phase, and oxidation of propylene in propyleneoxyde in solution)
4. Degradation as a method of modification of polymer materials. Creation of new materials (artificial silk by ozonolysis of polyethylenetherephtalate, fibres with natural polymer molecules on the surface and artificial polymer molecules inside of filaments by hydrolysis of triacetate of cellulose, purification of smoke sausage by action of ozone, creation of roughness on surface of polymer materials by ozonolysis, production of membranes with good properties by radiation of films by α-particles and hydrolysis after radiation)
5. Stabilization of polymers
6. Combustion of polymers
7. Relation between diffusion properties and rate of chemical reactions in polymer matrix
8. Prediction (prognoses) of life spent of polymers and composites
9. Polymers with precise life spent
10. Recycling.

Biology - Medicine

1. Cancer and antitumor preparations
2. Radiation damage (Chernobyl nuclear power plant)
3. Gerontology (how we can live longer)
4. Stress

Agriculture

1. Effect of superfine doses (plant growth regulators-pesticides and their efficiency)
2. Regulators of growth (pesticides)
3. Toxicity of chemical compounds

chembio@sky.chph.ras.ru

Computing macroscopic mechanical properties of heterogeneous composites

Hyunsun Lee
Hawai'i Pacific University, USA

Generalized Hashin-Shtrikman variational principle with di_erent order of statistics is used to compute a rigorous approximation on the macroscopic e_ective elastic moduli for composite materials with di_erent internal structures. For this purpose, the statistical and morphological features of the material are directly extracted from simulated or tomographic images and applied to the model. An interesting application with Liquid Crystal Elastomer (LCE) network composites will be introduced by coupling the model with piezoelectricity.

hlee@hpu.edu