All-Stretchable Electrodes: Experiments on Non-industrial Manufacturing

Portnov, Stepan (School: Higher School of Economics Lyceum)

The author substantiated the relevance of need for some essential professional skills in contemporary advanced technologies, such as all-stretchable electrodes manufacturing. Everyone can see great disadvantages of current commercial technologies in this area: expensive equipment, high energies, pressures and temperatures, toxic chemical substances and components. This disadvantages make almost unreal such experiments in the university chemical labs. But the need for scientific personnel in this and related fields will increase year by year. Therefore, non-toxic and environmentally friendly methods in experiments with all-stretchable electrodes manufacturing, graphene and elastomers applications have a tendency to become best practices for university chemistry curriculum. The author in the current work has proved: 1) Elements of all-stretchable (elastomer+graphene) electrodes for batteries and supercapacitors can be manufactured within non-industrial laboratory; 2) The collection of acceptable parameters (standard laboratory equipment, non-toxic and environmentally friendly components, samples quality parameters) can be obtained for non-industrial laboratory methods. The scope of author’s experiments within his home laboratory includes: 1)Various organosilicon (OS) elastomers synthesis; 2) Highly porous 3-D OS-matrices manufacturing using OS-elastomer vacuum infusion into sugar cubes; 3) Graphene oxide (GO) vacuum infusion into OS-matrices; 4) Reduction of GO layers within OS-matrices using non-toxic components and physical methods. Manufactured electrode samples confirmed estimated quality.

Awards Won: