SOL-GEL TECHNOLOGY PREPARATION OF THIN SOLID FILMS FOR DIFFERENT APPLICATIONS

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In present time of development of new products of micro- and nanoelectronics characterized by change from submicron to nanometer dimensions of topological elements. Vacuum film deposition techniques require expensive processing equipment, for which needs highly qualified personnel. In contrast, chemical methods, the sol - gel method, more accessible and implemented on simpler and cheaper equipment. Universality of technology, applied to chemical methods, allows producing coatings of controlled composition at low temperatures.

Coating must have determined properties in order to provide the normal operation of technological materials during their lifetime. Basic requirements for the coatings follows: the coating should be uniform over the surface without defects, stable in the environment, have high hydrophobicity and a density to protect a gains seepage of water and other substances to the surface, to have good adhesion to the surface, the transparency in the visible region spectrum, as well a protective coating should not affect to the surface characteristics and properties of the surface material.

Precursor solutions for sols will be prepared by hydrolyses of organic compound of silica, titanium, boron, aluminium et. al . Sol-gel films were fabricated by means of spin- or dip- or spray-coating on a substrate at room temperature. Then films will be heated at 200^0 – 1200^0C in air or inert gases.

All known coating to protect or planarize or different application have a different limitations, low transparency in the visible spectrum or a high glass transition temperature or low adhesion to the surface, etc. Therefore, development of sol-gel technology fundamentally new hybrid organic-inorganic coatings is very important and actual task.

We are developed new method of protection and planarization inorganic substances: silica glasses, silicon plates and another specific products (Fig.1).

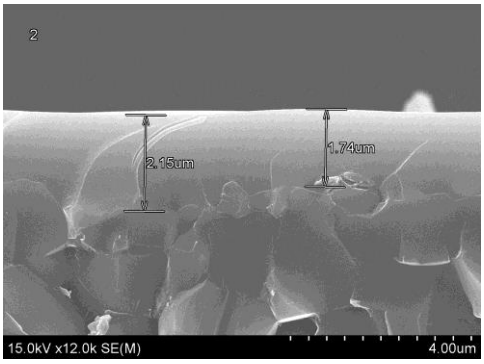

Figure 1. SEM image of ceramic plat with SiO_2 planar films on the surface

The decorative ceramic sol-gel coatings with high hardness (6H), resistant to moisture and heat resistant properties (400 ^{o}C) can be used in the paint industry, production of metal utensils, production of furniture accessories etc. (Fig.2).

As a result we can obtain films on different substrates: glass, silicon, aluminium, steel etc. This technique is resources and energy consuming. The technique of reception of various functional coats developed in our laboratory has are used at the factories of the optical industry (at a factory "Optic" (Lida, Belarus) output is adjusted of lenses with sol-gel decorative coating), electronic industry "Integral" (Minsk, Belarus) (sol-gel dielectric coating materials) and et.al.

Figure 2. Image of the aluminium plates with decorative films base silica dioxide