

Microstructure of titanium films formed by induction PVD on alumina ceramics
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Metallization processes are widely used to form metal surfaces on ceramic, glass and metal-ceramic products in instrument making. The formation of metal layers (metallization) is carried out by heat treatment of a ceramic material in chemically active media, for example, special pastes, melts, as well as CVD and PVD methods. PVD methods have found the greatest application for metallization, allowing the formation of high-purity, high-quality layers on various materials. Metallization, for example copper plating of ceramic materials (Al_2O_3 , SiC, AlN, BeO), is used in the production of substrates for high-power electronic devices. The adhesion of copper films on the ceramic surface is increased to more than 8 MPa by forming a **PVD titanium sublayer**.

The studies were carried out by the method of scanning electron microscopy (SEM) with energy dispersive X-ray analysis (EDX) of the chemical composition.

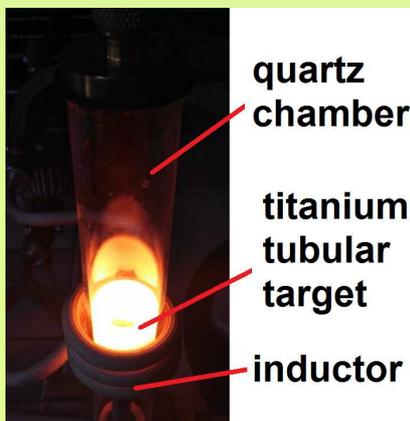


Fig. 1. Induction vacuum deposition process

The work investigated the microstructure of layers formed on alumina ceramics by vacuum sputtering. In the process of obtaining titanium layers for sputtering a tubular target, induction heating up to 1400-1600 °C was used (**fig.1**). The process lasted 3-5 minutes. As a result, the surface of the ceramic sample acquired a dark blue color (**fig. 2**).



Fig. 2. Alumina sample

It was established by **SEM** and **EDX** methods that, during sputtering, a titanium film with a thickness of up to **1–2 μm** was formed on a ceramic substrate (**fig. 3a**), consisting of rounded particles up to **150 nm** in size (**fig. 3b**).

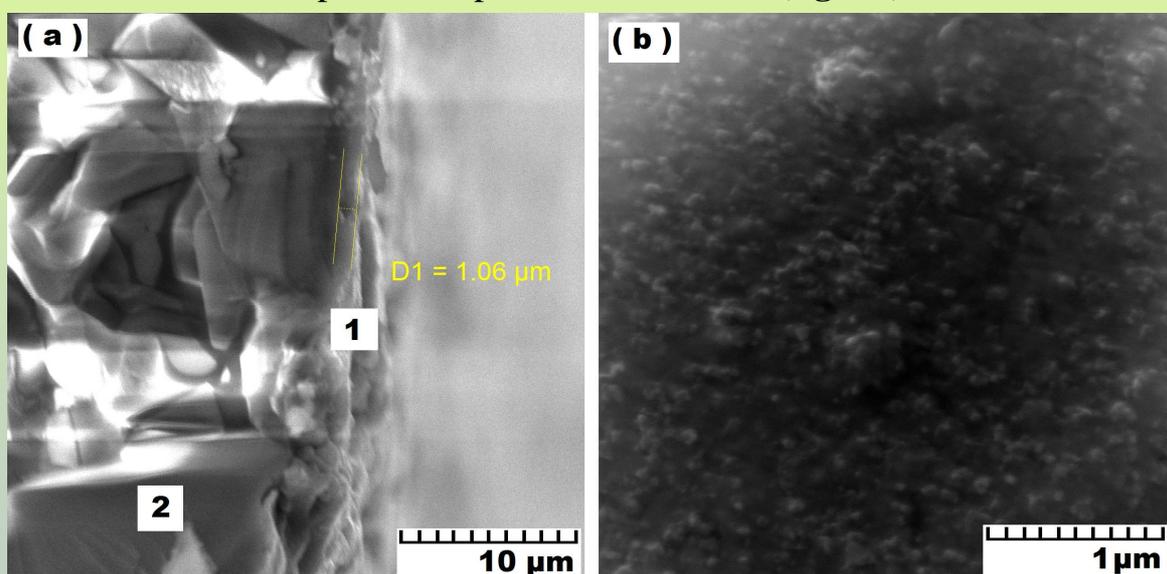


Fig. 3. Microstructure of titanium layer (1) formed on aluminum oxide (2)