Abstract
This paper contains study results of the nitride containing composites features formed in the compacted Al-TiO2-C-Si samples inside a high pressure reactor with various nitrogen pressure values. The nitriding and carbide-formation processes take place simultaneously with aluminothermic reduction of titanium oxide in the self-propagating high-temperature synthesis (SHS) mode. It has been found that the nitrogen pressure effect is manifested as insignificant reduction of the combustion temperature and increased durability of the synthesized composite. The SHS process in the nitric environment leads to practically complete reduction of titanium oxide, the free titanium being absent. The X-ray analysis has revealed that the basic SHS products are refractory compounds such as metal nitrides, carbides, and oxides. Increase in nitrogen pressure results in decrease of the specific electric resistance of the synthesized composites caused by growth of the electroconductive phases i.e. titanium carbides, nitrides, and silicides. Performed electron microscopic study including the energy dispersion analysis of the morphology and structure of the SHS products has revealed formation of the nano-sized titanium silicide crystals distributed between the complex carbonitride particles. The complex carbonitride composites synthesized in the high pressure reactor are of interest as highrefractory and abrasive materials considering their physical and chemical properties.