



Titanium minerals of placer deposits as a source for new materials

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Heavy mineral deposits are a source of the economic important element titanium, which is contained in ilmenite and leucoxene. The mineral composition of placer titanium ore and localization pattern of ore minerals determine their processing and enriching technologies. New data on the mineralogy of titanium ores from modern coastal-marine placer in Stradbroke Island, Eastern Australia, and Pizhma paleoplacer in Middle Timan, Russia, and materials on their basis are presented.

The samples were studied by the following methods: optical-mineralogical (stereomicroscope MBS-10, polarizing microscope POLAM L-311), semiquantitative x-ray phase analysis (x-ray diffractometer X'Pert PRO MPD). Besides microprobe (VEGA 3 TESCAN) and x-ray fluorescent analysis (XRF-1800 Shimadzu) were used.

By the mineralogical composition ores of the both deposits are complex: enriched by valuable minerals. Apart from main ore concentrates it is possible to obtain accompanying nonmetallic products. This will increase the efficiency of deposit exploitation. Ilmenite dominates in ore sands of Stradbroke Island, and leucoxene dominates in the ores of the Pizhma titanium deposit. Australian ilmenite and its altered varieties are mainly characterized by a very high MnO content (from 5.24 to 11.08 %). The irregular distribution of iron oxides, titanium and manganese in the altered ilmenite was shown in the paper. E.g., in the areas of substitution of ilmenite by pseudorutile the concentrations of the given elements are greatly various due to various ratios of basic components in each grain. Their ratios are equal in the area of rutile evolution. Moreover, the high content of gold, diamonds and also rare earth elements (REE) and rare metals (their forms are not determined) were studied. We found native copper on the surface of minerals composing titanium-bearing sandstones of the Pizhma placer.

According to the technological features of rocks (density and magnetic) studied placers are close. The obtained results of physical studies, mineral composition features, morphostructural characteristics and degree of alteration of titanium minerals from the placers specify a high potential of physical methods of processing (gravitational and magnetic separation, flotation) and possible application of combined methods of processing.

Production of pigment titanium dioxide for further production of titanium white, paper, plastics etc is the usual application area of titanium concentrates. Titanium dioxide of high chemical purity is used to produce optically transparent glass, fiber optics, electronics (iPad), piezoceramics, in medical and food industry.

We designed photocatalysts based on leucoxene from Pizhma placer. The results showed that the photocatalysts based on rutile, synthesized from leucoxene from Pizhma deposit, can be applied to decay phenols in water.