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[P2] Raw Materials & Recycling

Session Chair: Mr. Johann Fischbacher (University for Continuing Education Krems, Austria), Dr. Yusuke Hirayama (AIST, Japan)

[P2-24] CREATION AND DEVELOPMENT OF TECHNOLOGIES FOR PRODUCING RARE-EARTH METALS «GIREDMET» FOR USE IN VARIOUS INDUSTRIAL AREAS

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Currently, Russian industry is consistently developing the entire technological chain of the rare earth elements (REE) industry: mining and extraction of REE obtaining metals and introducing them into high-tech production. Sazhin Giredmet JSC is a leading Russian research and design organization specializing in the development of new materials based on rare earth metals (REM), their compounds and alloys, high-purity substances, and semiconductor materials. An experimental extraction site has been created and is operating, allowing for the extraction, separation, and purification of REM from their solutions. The site is equipped with extractors (100 pcs.). At the same time, JSC Giredmet is improving technologies for obtaining metallic REM by metallothermic reduction of REM oxides and halides with the delivery of metal products to consumers, including those producing special products. Our enterprise uses both the legacy of Soviet science and introduces innovative technologies. At present, the production of REM by metallothermy methods (Ca, La, Li) has been implemented and launched, the estimated volume of output is tens of kilograms per month, with the possibility of scaling into tons. Today, the technology of electrolysis from oxide-fluoride melts is being implemented. The competencies in obtaining and purifying anhydrous REE chlorides, which are precursors for obtaining organometallic compounds and high-purity metallic REE, have been preserved and are practically applied. This has expanded the scope of their application for special alloys. Sazhin Giredmet JSC develops manufacturing technologies and produces alloys with REM as finished products in the form of ingots, strips and powder. One of the promising areas of development is the production of metal hydride alloys based on La and Ni. Gaseous hydrogen is capable of entering into a chemical reaction with metals and alloys, forming solid compounds. The reaction is reversible, which allows implementing cycles of loading and unloading metal hydride storage devices. The development of hydrogen storage alloy technology, which in addition to storing hydrogen would also act as hydrogen purifiers from harmful impurities (oxygen, nitrogen, water vapor) is an important part of maintaining a green ecology.

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