



SPIE



ACCESS TO RARE EARTHS AND CRITICAL MATERIALS

SPIE, the International Society for Optics and Photonics, supports Congressional efforts to insure a reliable supply of rare earth elements (REEs) and critical materials necessary to sustain optics and photonics manufacturing in the U.S. Rare Earths are essential for new energy technologies and defense technologies ranging from LED lighting to lasers and SPIE recommends identifying and developing alternative sources of critical materials, instituting rare earth recycling programs, and providing federal incentives, if necessary, to ensure availability and national security. SPIE endorses H.R. 618 and S.383 and welcomes the inclusion of rare earth-related language in the FY 2012 National Defense Authorization Bill (H.R. 1540) and encourages the Senate to approve similar language.

During the last session of Congress, SPIE supported bipartisan passage of *The Rare Earths and Critical Materials Revitalization Act of 2010* (H.R.6160). In addition to the actions outlined in this legislation, we urge Congress to also address issues with current suppliers, institute rare earth recycling programs, and immediately identify alternative supply sources.

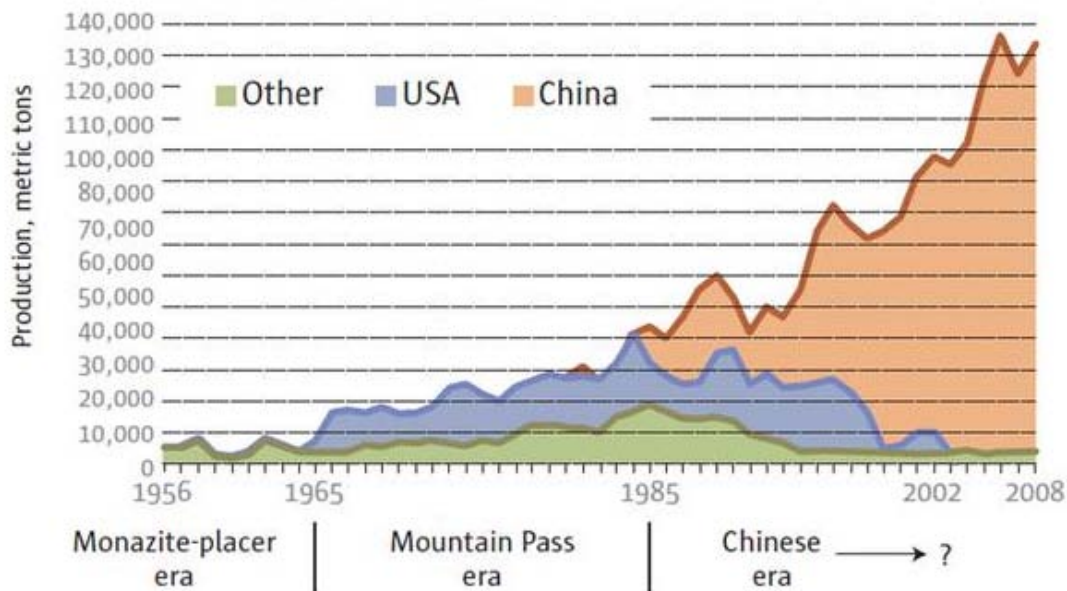
Recent global shortages of rare earth materials highlight the need for action to preserve access to these resources, which are critical to our economy and national security. Dominant uses for rare earth elements in the U.S. are for auto catalysts and petroleum refining catalysts. Other elements are used in glass polishing, color television and flat panel displays (e.g. cell phone, smart phones, portable DVD's and laptops) rechargeable batteries for hybrid and electric vehicles, medical devices, missile guidance systems, space-based satellites and communications, and numerous electrical and electronic components.

SPIE is concerned about supply restrictions and disruptions that raise prices to prohibitive levels or deny access to U.S.-based manufacturers. Fifteen of the seventeen rare earth elements impact the optics and photonics industry, which supplies components used in millions of products and enables much of today's innovation. Key defense applications, ranging from precision-guided munitions to precision optics to certain lasers, depend on rare earth materials for functionality. So do increasingly popular green technologies and electronic goods like hybrid cars, wind turbines, and mobile phones. As growing global demand begins to outstrip supply of key elements, this plan will help to ensure that oxides, alloys, metals, and magnets are available for critical defense requirements.

Last year, a dispute between China and Japan led to a heightened urgency in addressing the issue of rare earth availability. During that time, the cost of Cerium, a rare earth used in polishing and phosphors, increased from \$5 per pound to \$40 per pound. For example, JENOPTIK Optical Systems, an SPIE corporate member with U.S. manufacturing facilities across the country, has seen a 16-fold increase in the price of a cerium oxide which has resulted in increased costs, decreased profit margins, and an ever-growing challenge to remain globally competitive. Optics

manufacturers are facing significant losses and revising bids to include a Cerium surcharge, including contracts with the DoD. SPIE hopes Congress will focus on creating diversity in our domestic production of such materials, including providing financial incentives and regulatory relief if necessary to secure access.

Rare-Earth Metals: Production



Source: U.S. Geological Survey

Jonathan Moreno, *The Denver Post*

Table I. Rare Earth Elements (Lanthanides): Selected End Uses

Light Rare Earths (more abundant)	Major End Use	Heavy Rare Earth (less abundant)	Major End Use
Lanthanum	hybrid engines, metal alloys	Terbium	phosphors, permanent magnets
Cerium	auto catalyst, petroleum refining, metal alloys	Dysprosium	permanent magnets, hybrid engines
Praseodymium	magnets	Erbium	phosphors
Neodymium	auto catalyst, petroleum refining, hard drives in laptops, headphones, hybrid engines	Yttrium	red color, fluorescent lamps, ceramics, metal alloy agent
Samarium	magnets	Holmium	glass coloring, lasers
Europium	red color for television and computer screens	Thulium	medical x-ray units
Gadolinium	magnets	Lutetium	catalysts in petroleum refining
		Ytterbium	lasers, steel alloys

Source: DOI, U.S. Geological Survey, Circular 930-N.

SPIE is the largest international not-for-profit society in optics, photonics and imaging. Together with our 16,000 individual members and 450 corporate members, the Society seeks to build a better world with light through scientific education and innovation. www.spie.org.