Non-Traditional Materials Research at ORNL:
From Rare Earths and Actinides to Stainless Steel Crystals

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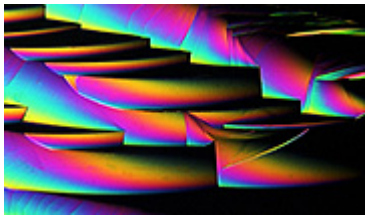
ABSTRACT: ORNL has enjoyed a long history of original, frequently non-traditional, materials research in which unique combinations of the capabilities of the Laboratory have been successfully applied. These capabilities have included, among others, the availability of actinide isotopes produced at the High Flux Isotope Reactor (HFIR) and then separated and purified at the TRU Facility - as well as enriched stable isotopes separated using the Calutrons at the Y-12 Facility. At one point, the ORNL capability for growing single crystals of transuranic-containing elements (a capability that has now been lost) was essentially unique in the world. Examples will be given of some of the materials research at ORNL in which actinides or rare earths played an important role - and of other non-traditional materials science research such as the growth and application of stainless steel single crystals to the science of welding or the use of ion implantation to form "smart" nano-composite surfaces.



BIOGRAPHICAL INFORMATION: Lynn Boatner received a Ph.D. degree in physics from Vanderbilt University in 1966. He is currently an ORNL Corporate Fellow and Battelle Distinguished Inventor in the ORNL Materials Science and Technology Division. Lynn is a Fellow of: the American Physical Society, the American Ceramic Society, the Mineralogical Society of America, the Materials Research Society, the American Association for the Advancement of Science, ASM International, and the Institute of Materials, Minerals, and Mining of the UK. He has received a number of awards for his research, including: R&D 100 Awards in 2010, 1996, 1985, and 1982; The AACG Crystal Growth Award of the American Association for Crystal Growth, (2003); and the Frank H. Spedding Award for Excellence in Rare Earth Research, (2002).