Researchers working to recover rare-earth elements and secure critical materials for clean energy technologies

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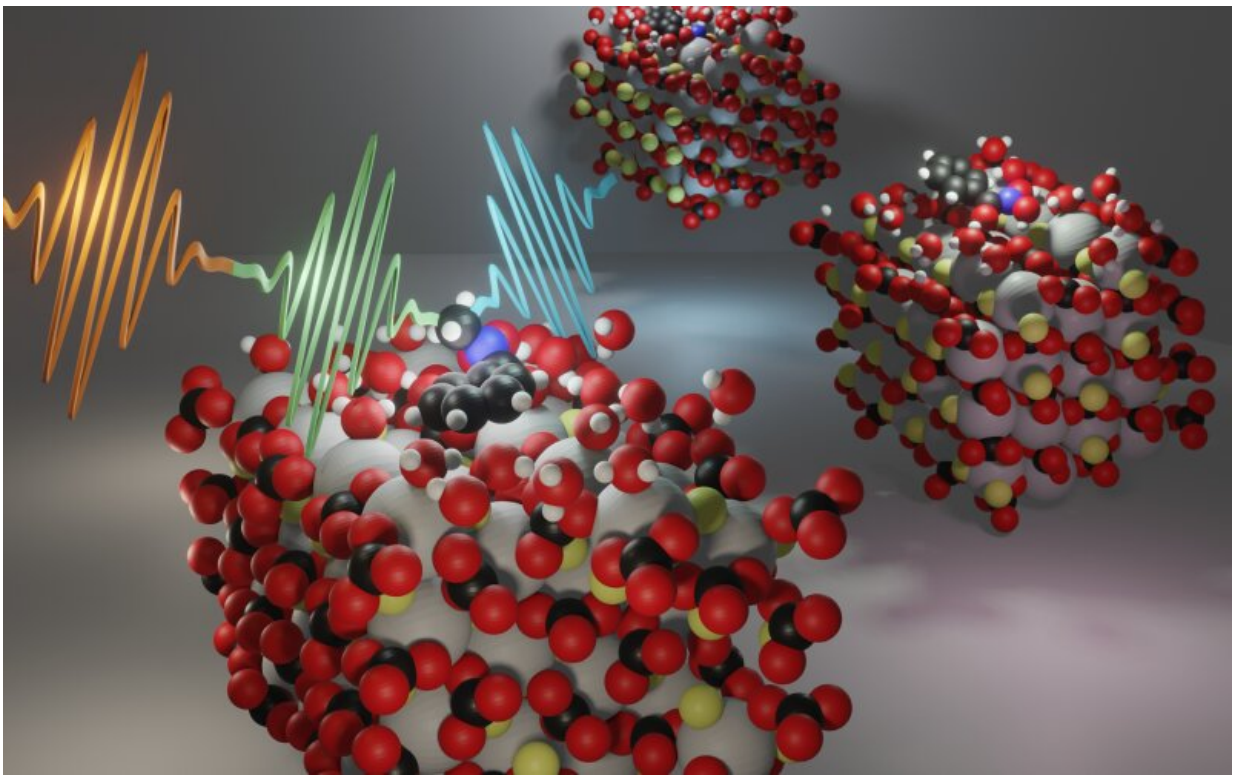

Researchers at Oak Ridge National Laboratory shed light on chemical separations to recover rare-earth elements. Credit: Ben Doughty/ORNL, U.S. Dept. of Energy

Researchers at Oak Ridge National Laboratory are using state-of-the-art

methods to shed light on chemical separations needed to recover rare-earth elements and secure critical materials for clean energy technologies.

Bastnäsite deposits in the United States are rich in rare-earth metals but must be mined and separated from unwanted minerals through chemical processes that are not well understood. Fundamental insights are needed to improve current recovery approaches based largely on trial and error. Greater efficiency offers cost-savings as well as benefits to the environment by decreasing mining and carbon impacts.

"The path forward will require predictive modeling to help us discover the best candidates for more efficient separations," said ORNL's Vyacheslav Bryantsev.

The team combined theory and spectroscopy methods to design collector molecules that buoy bastnäsite out of an ore mixture to enhance recovery by froth flotation. Their study, published in *Langmuir*, supplies missing information for modeling future collectors tailor-made for efficient separations.

More information: Robert C. Chapleski et al, Improving Rare-Earth Mineral Separation with Insights from Molecular Recognition: Functionalized Hydroxamic Acid Adsorption onto Bastnäsite and Calcite, *Langmuir* (2022). DOI: 10.1021/acs.langmuir.1c03422

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