

Faculty Name:

Yuan Yang

Faculty Email:

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Lab:

Yang's Lab

Project Title:

Enriching ^{48}Ca isotope for synthesizing superheavy elements

Description:

Enrichment of ^{48}Ca beyond the gram level is critical for advancing scientific frontiers, such as creating new heavy elements, and Neutrinoless Double Beta Decay experiments to examine the Standard Model. However, the natural abundance of ^{48}Ca in the Earth's crust is only 0.187%. The student will get involved in developing chemical methods to enrich ^{48}Ca at ambient conditions and with a low cost. In chemical exchange, Ca ions will exchange between a solid phase and a liquid phase. Due to isotope mass-dependent phonon free energy, ^{48}Ca , the heaviest Ca isotope, will be enriched in one phase. The goal of research is to find materials which maximize such isotope enrichment.

The general design rules for screening suitable materials: the two phases should have distinct chemical environments for Ca^{2+} , such as different bond strength and different Debye temperature. We will screen potential materials, such as Ca-ion battery materials and Ca salts to maximize the separation factor.

Location of Research:

On-Site

of hrs/week:

30

Department/Program:

Applied Physics and Applied Mathematics

Eligibility:

MS

To apply, please contact:

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