

Isotopic molecular geochemistry: Using isotopes to probe nanoscale processes at mineral surfaces



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Frontiers in Geochemistry
Seminar Series

Presented by...

Prof. Donald J. DePaolo

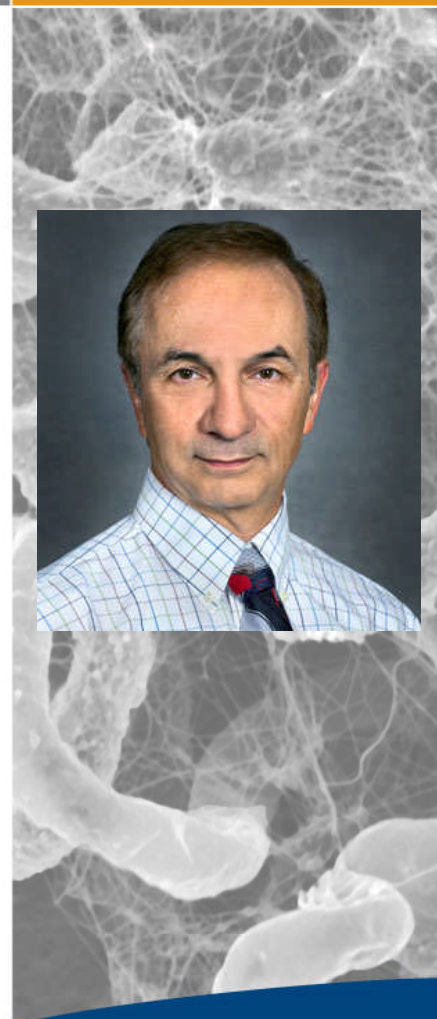
- Director, Center for Isotope Geochemistry
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Recent work on mid-mass “non-traditional” stable isotope systems like Ca, Mg, Fe, Cr, and Mo suggests that minerals like calcite that form by precipitation from aqueous solution do not do so at isotopic equilibrium. In most instances the precipitated solid phase is enriched in the *light* isotope species relative to the solution phase, and the magnitude of the enrichment varies with precipitation rate. Non-equilibrium isotopic effects are especially apparent for mid-mass elements because the equilibrium fractionations are very small; the effects are of broad interest because isotopic fractionation can be a measure of the molecular exchange fluxes at mineral-solution interfaces, and calcite and other carbonates and sulfates are widely used as monitors of paleo-environment. Molecular exchange fluxes are difficult to measure with other approaches, and are likely to be sensitive to the presence of trace metals and organic molecules in solution and on the mineral surface.

Recent experimental results on Ca and O isotopes will be reviewed, and a macroscopic kinetic theory for isotopic fractionation and trace element incorporation into calcite presented. Examples of kinetic isotopic effects that are important in nature will be illustrated using Ca isotopes, O isotopes and Sr/Ca in calcite, and O and H isotopes in precipitation.

More info:

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Tuesday

May 25, 2010

EMSL Auditorium

9:00 – 10:00 am