CHEMISTRY & BIOCHEMISTRY

SEMINAR PROGRAM

DEPARTMENT OF CHEMISTRY & BIOCHEMISTRY
UNIVERSITY OF OKLAHOMA

NORMAN, OK 73019-3051 ★ (405) 325-4811 ★ FAX: (405) 325-6111

We Are Pleased to Announce a Seminar
Presented By

Hans-Conrad zur Loye
University of South Carolina

Friday, February 24, 2023
1:00 pm
SLSRC 2410

From Mild Hydrothermal to High Temperature Solutions: Crystal Growth of New Uranium and Transuranium Phases

A nuclear waste form is a stable, solid matrix for the immobilization of radioactive and hazardous constituents present in nuclear waste. There are a variety of waste forms currently in use and many more being studied for potential use. Or center is developing new materials as potential waste forms. To achieve this goal we are preparing and testing numerous actinide containing materials. I will present some of our efforts focussing on the crystal growth of uranium and transuranium containing phases via two different crystal growth routes, mild hydrothermal and high temperature solution flux growth and their evaluation as potential waste forms. The mild hydrothermal route works extremely well for crystallizing complex fluoride phases, such as $Na_3GaU^{IV}_6F_{30}$, $Na_3AlNp^{IV}_6F_{30}$, and $Na_3FePu^{IV}_6F_{30}$, while the high temperature flux route works well for crystallizing oxide phases, such as $Cs_2Pu^{IV}Si_6O_{15}$ and $Na_2Pu^{V}O_2(BO_3)$. The synthesis and structures of these phases as well as a series of new chalcogenides will be discussed, along with our appraoch of identifying potential compositions that we can pursue synthetically. (More information on the back.)

Refreshments will be served

Acknowledgements: This work was supported as part of the Center for Hierarchical Waste Form Materials, an Energy Frontier Research Center funded by the U.S. Department of Energy, Office of Science, Basic Energy Sciences under Award No. DE-SC0016574 and by the US Department of Energy, Office of Basic Energy Sciences, Division of Materials Sciences and Engineering under award DE-SC0018739.Work conducted at Savannah River National Laboratory was supported by the U.S. Department of Energy under contract DE-AC09-08SR22470.

References:

Christian, M., Pace, K. A., Klepov, V. V., Morrison, G., zur Loye, H.-C., Besmann, T., Cryst. Growth Design, **2021**, *21*, 5100-5107.
Pace, K. A., Klepov, V. V., Berseneva, A. A., zur Loye, H.-C., Chem. Eur. J., **2021**, *27*, 5835-5841.
Breton, L. S., Klepov, V. V., zur Loye, H.-C., J. Am. Chem. Soc., **2020**, *142*, 14365-14373.
Pace, K. A., Klepov, V. V, Deason, T. K., Smith, M. D., DiPrete, D. P., Amoroso, J. W., zur Loye, H.-C., Chemistry a European Journal **2020**, *26*, 12941-12944.
Pace, K. A., Klepov, V. V, Christian, M. S., Morrison, G., Deason, T. K., Besmann, T. M., DiPrete, D. P., Amoroso, J. W., zur Loye, H.-C., "Chem. Commun., **2020**, *56*, 9501-9504.
Berseneva, A. A., Klepov, V. V., Pal, K., Seeley, K., Koury, D., Schaeperkoetter, J., Wright, J., Misture, S. T., Kanatzidis, M. G., Wolverton, C., Gelis, A. V., zur Loye, H.-C., J. Am. Chem. Soc., **2022**,*144*, 13773-13786.