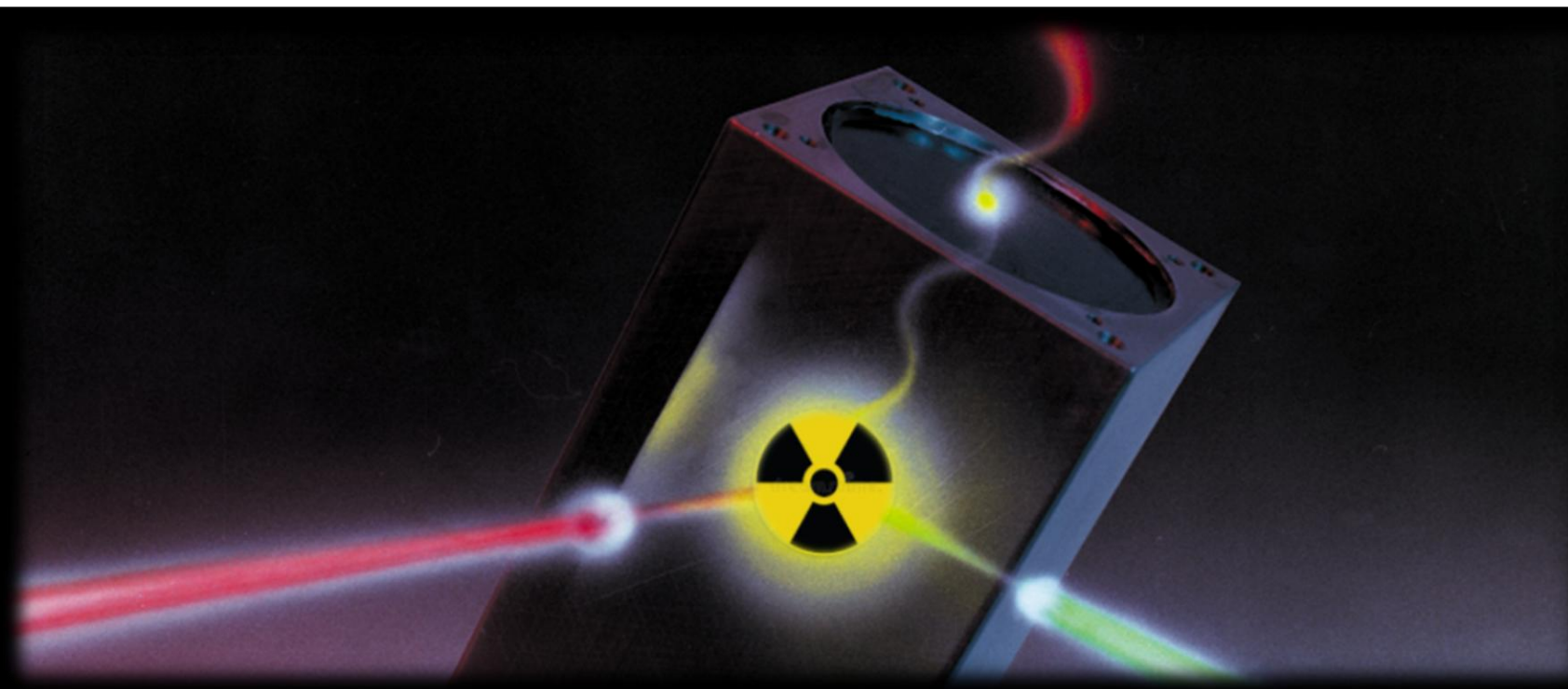




Radiochemistry

AG Huittinen in 5 minutes

Who are we?



Nina Huittinen
The prof



Mathias Ellwanger
Staff scientist



Jacqueline Grewe
Chemical-technical assistant



Anja Peuker
Chemical-technical assistant



Falk Wenzlaff
Chemical-technical assistant



Daniela Doppelstein
Secretary, also AG Müller

6th floor



Luiza Braga Ferreira dos Santos
Ph.D. student



Kevin Stuke
Shared Ph.D. student
@Forschungszentrum Jülich



Vincent Ohls-Czepan
M.Sc. student



Patricia Christel Milagros Große
M.Sc. student



Moritz Ernst (AG Müller)
Ph.D. student and radiation safety officer



What do we do? – Teaching

- Radiochemistry: Fundamentals and modern applications, every winter term (5 LP)
- Radiochemistry lab course, every summer term (5 LP)
- Inorganic Chemistry III: Modern inorganic molecular and solid state chemistry, every summer term (5 LP)

Coming up

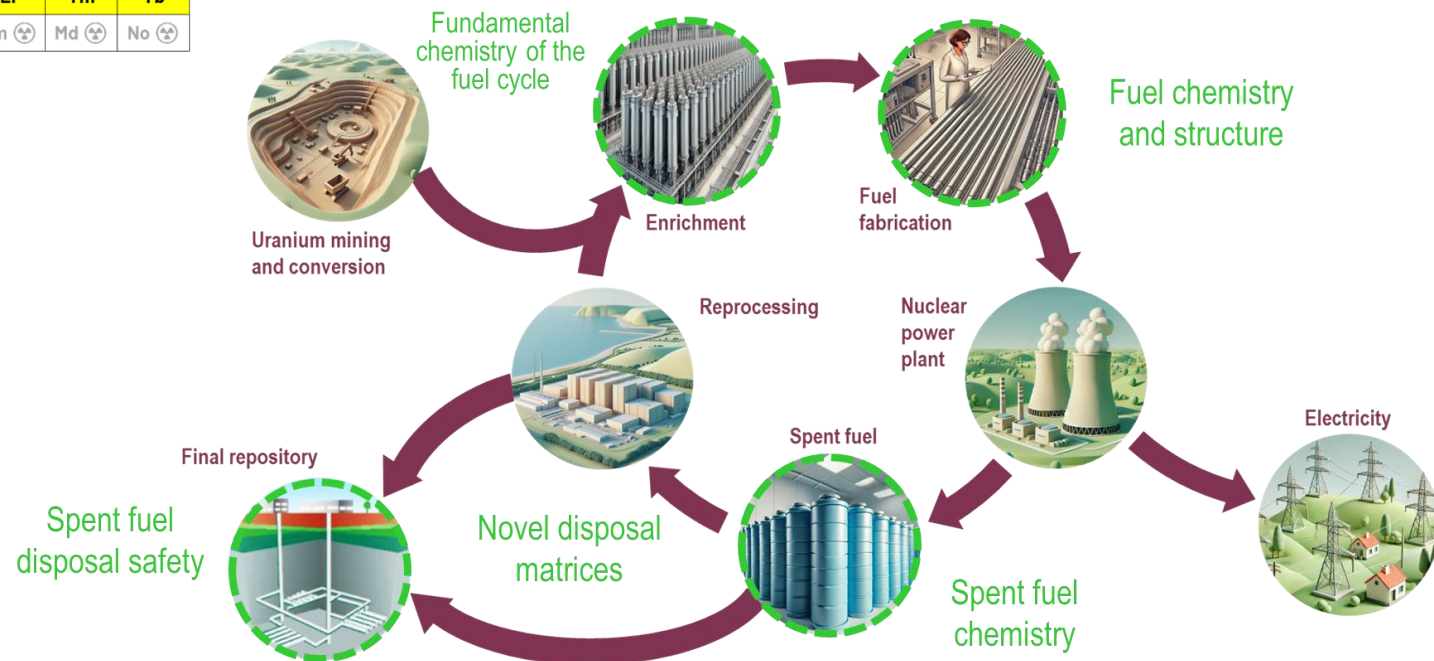
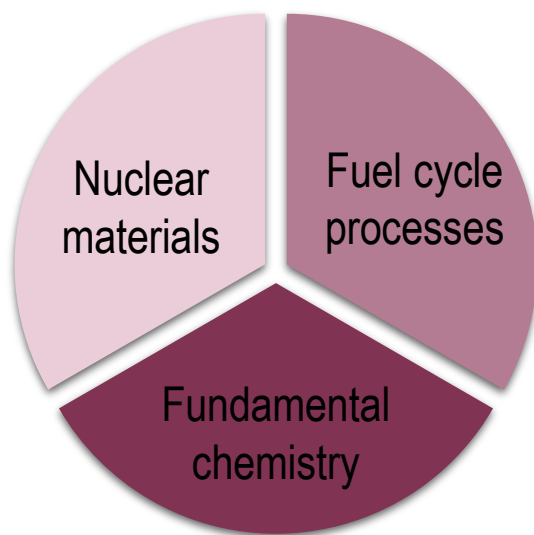
- Radiation safety module (lecture+lab), every winter term starting in 2026/2027 (required to become radiation safety officer) (5 LP)



What do we do? – Research

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb		
		Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No		

We explore the chemistry of the radioactive elements,
from molecules to solid materials.



What do we do? – Chemistry and spectroscopy

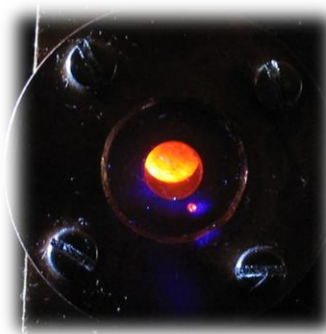
Luminescence spectroscopy

57 La lanthanum	58 Ce cerium	59 Pr praseodymium	60 Nd neodymium	61 Pm promethium	62 Sm samarium	63 Eu europium	64 Gd gadolinium	65 Tb terbium	66 Dy dysprosium	67 Ho holmium	68 Er erbium	69 Tm thulium	70 Yb ytterbium	71 Lu lutetium
89 Ac actinium	90 Th thorium	91 Pa protactinium	92 U uranium	93 Np neptunium	94 Pu plutonium	95 Am americium	96 Cm curium	97 Bk berkelium	98 Cf californium	99 Es einsteinium	100 Fm fermium	101 Md mendelevium	102 No nobelium	103 Lr lawrencium

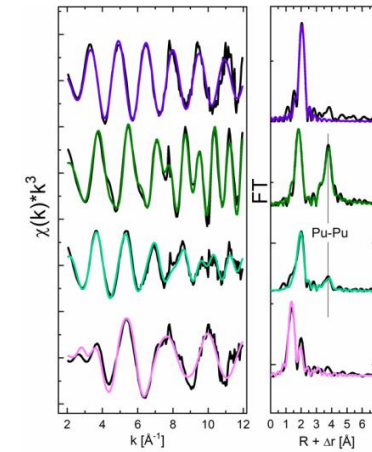
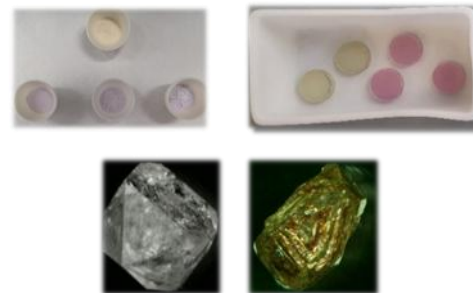
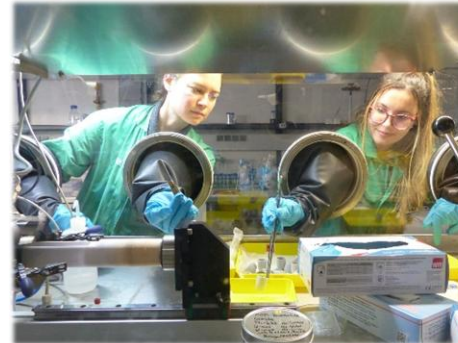
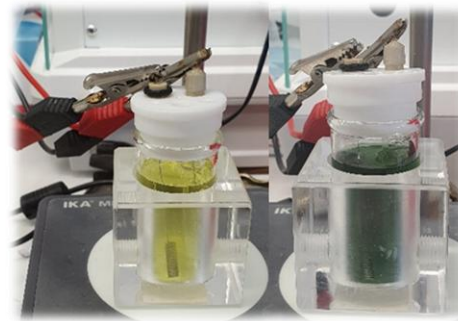
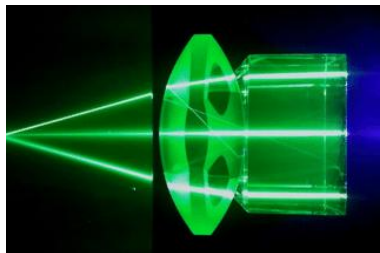
Eu(III) luminescence



Cm(III) luminescence

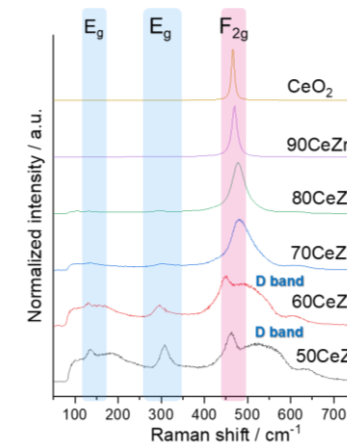


U(VI) luminescence

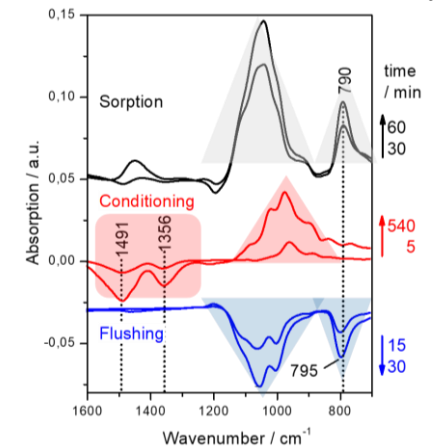


X-ray absorption spectroscopy

Raman spectroscopy

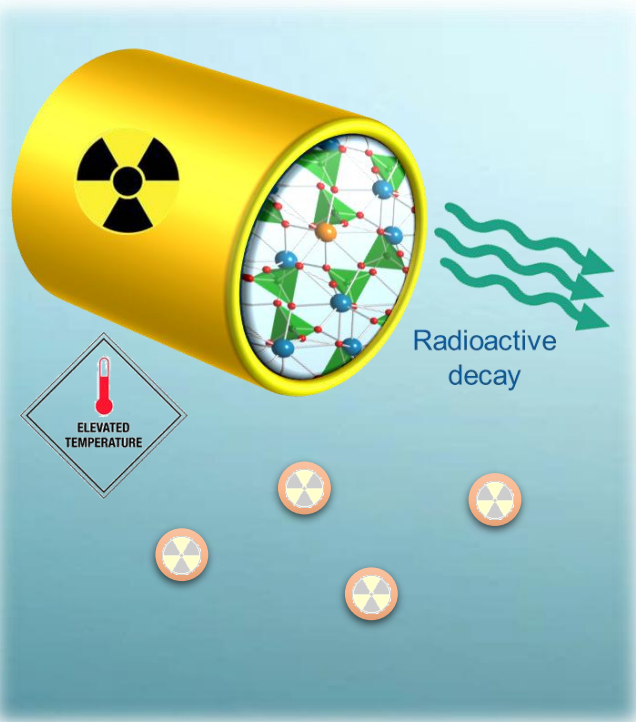
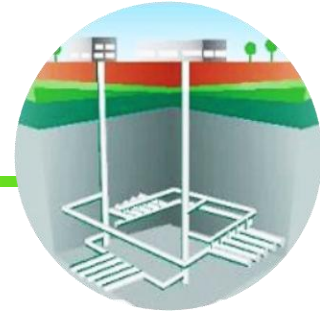


ATR-FT-IR spectroscopy



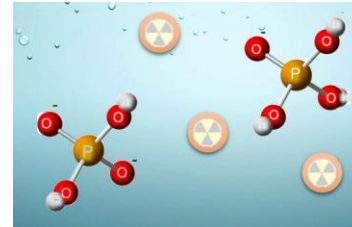
What do we do?

Spent fuel
disposal safety

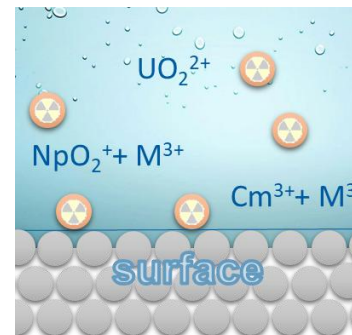


actinium 89	thorium 90	protactinium 91	uranium 92	neptunium 93	plutonium 94	americium 95	curium 96
Ac	Th	Pa	U	Np	Pu	Am	Cm
[227]	232.04	231.04	238.03	[237]	[244]	[243]	[247]

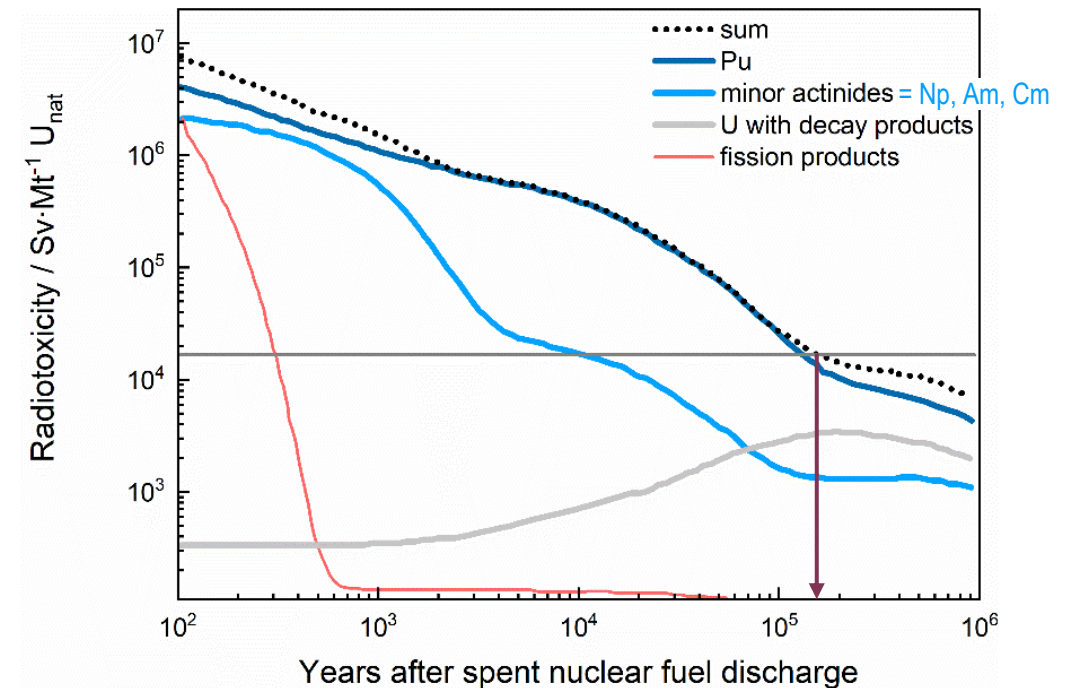
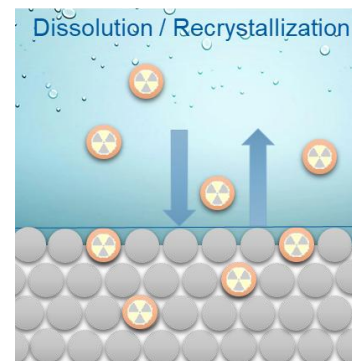
Solution



Interface

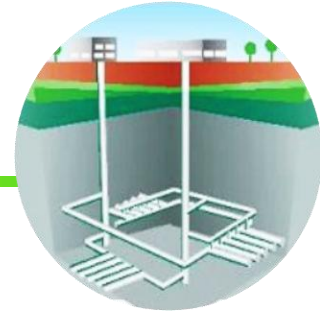


Solid



What do we do?

Spent fuel
disposal safety



Ph.D. position coming up: Start date 1st of March

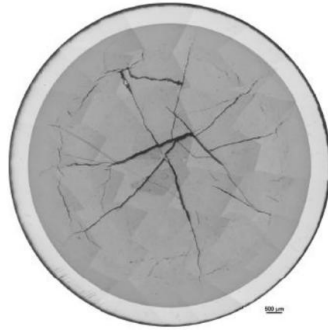
Research assistant (praedoc) (m/f/d) with 75%- part-time job limited to 3 years (subject to funding approval), salary grade (Entgeltgruppe) 13 TV-L

Job description

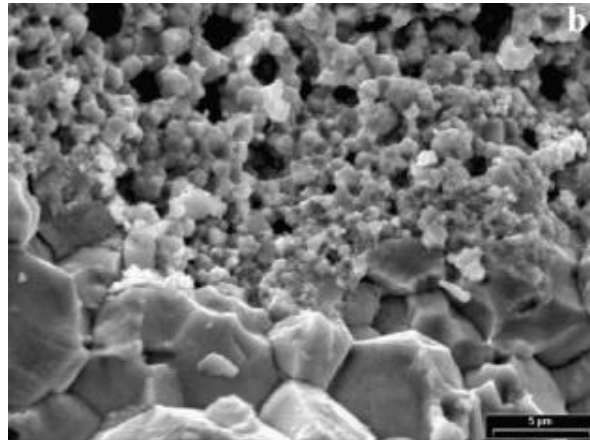
The Huittinen group at the Freie Universität Berlin, in collaboration with Helmholtz-Zentrum Dresden-Rossendorf (HZDR), is offering a Ph.D. position (75%) in environmental radiochemistry. This project focuses on the behavior of plutonium (Pu) in carbonate-rich environments, with an emphasis on its adsorption, incorporation, and redox chemistry in the context of deep geological repositories for high-level radioactive waste.

What do we do?

Spent fuel
chemistry

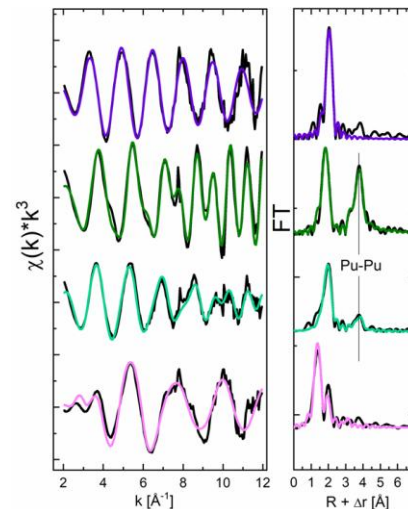
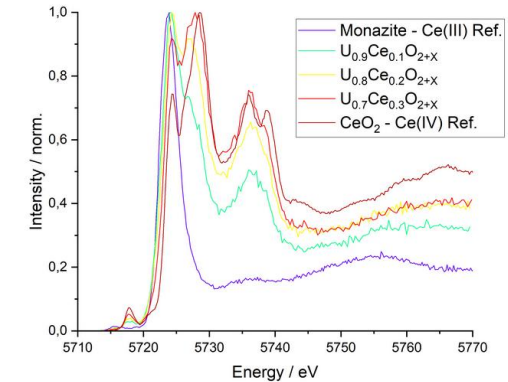
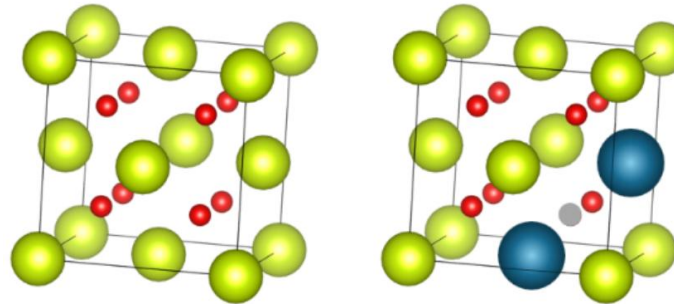


Regions in MOX experience high burnup (fission)
→ High burn-up structure (HBS) → appears as nanomaterial



Noirot et al. (2008) J. Nucl. Mater. 372, 318-339

Surrogate and MOX model systems for HBS chemistry



Pu(III) starting solution



Pu(IV)O₂ NPs



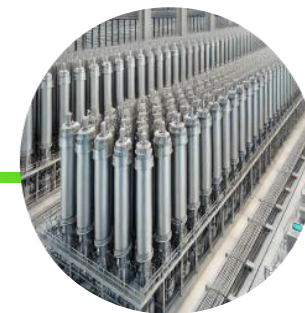
Kevin Stuke
Shared Ph.D. student
@Forschungszentrum Jülich



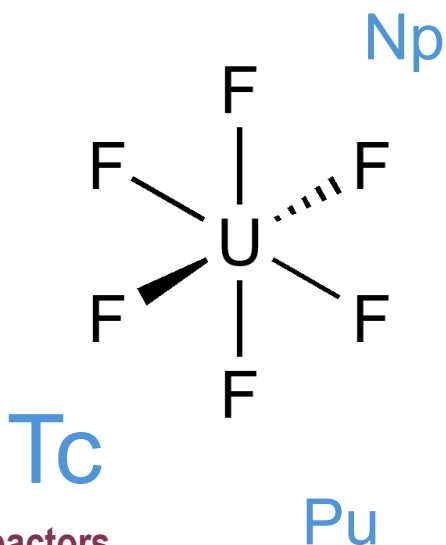
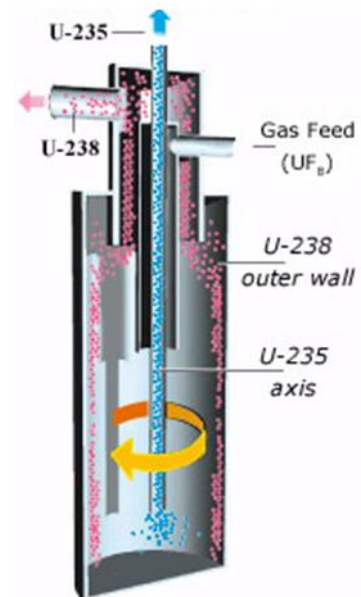
Patricia Christel Milagros Große
M.Sc. student

What do we do?

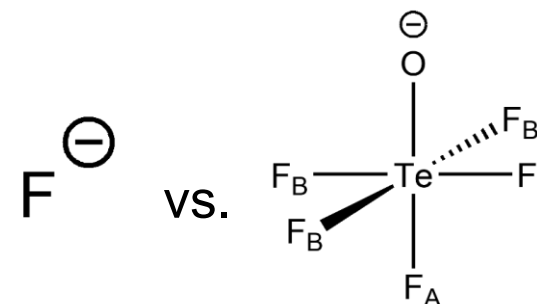
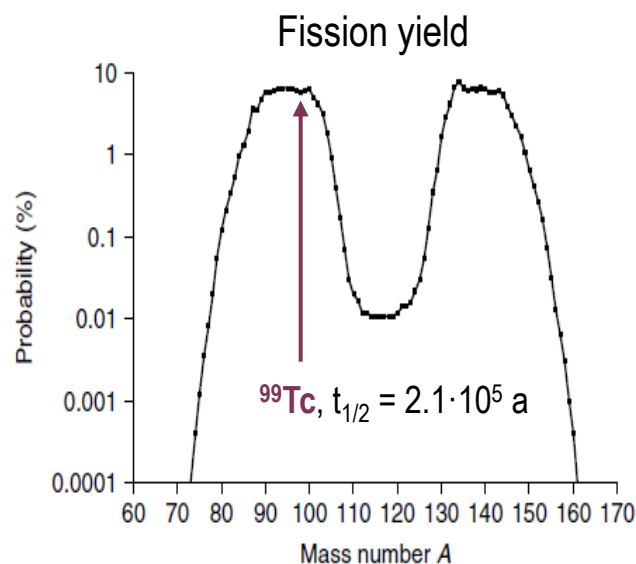
Fluorine in the
fuel cycle



²³⁵U-enrichment



Fluorine/teflate chemistry of radionuclides

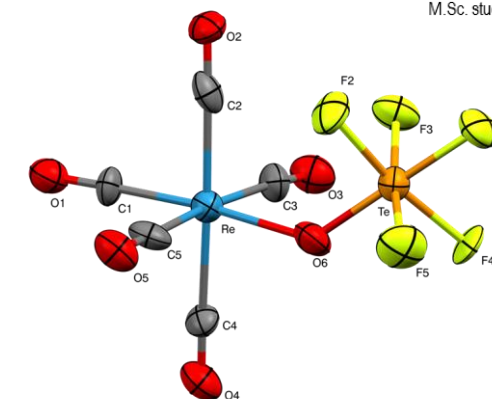
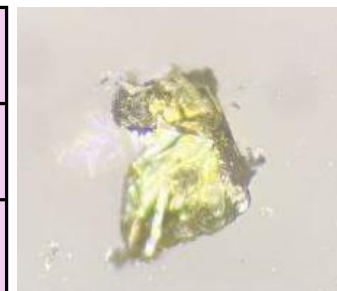


Vincent Ohls-Czepan
M.Sc. student

Molten salt reactors



Cr	Mn	Fe
Mo	Tc	Ru
W	Re	Os

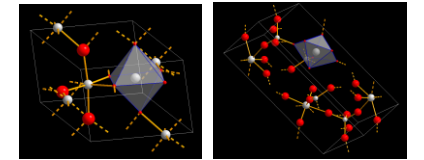


Single crystals $[\text{Re}(\text{CO})_5(\text{OTeF}_5)]$

What can we offer



- 1 Ph.D. position with substantial work at HZDR in Dresden
 - Graduate school on nuclear fuel disposal safety, Pu-redox chemistry and uptake by isostructural CaCO_3 and FeCO_3 phases
- Research internships and M.Sc. theses for students who have **successfully completed the radiochemistry module!**
 - Role of uranium coordination in solids on its luminescence properties (partly @HZDR) → Ayla Karnas-Gündüz
 - Electronic structure calculations of actinides in solids (with AG Paulus) (@FUB) → Carmen Wagner
 - Crystal structures of Zr and Re/Tc oxide and silicate solid solutions (@FUB) → Maikel Gries



We are happy to host new research internships and/or
Master's theses **from summer term onward**

Due to limited „slots“, please reach out early!

- Solid-state chemistry
- Coordination chemistry
- Geochemistry

See you at the posters



Inorganic chemistry building



Suspicious activity detected on top floor



Ah, nevermind, just the radiochemists

