



Radiochemistry

AG Huittinen in 5 minutes

- Est. May 2024

If you see me talking to myself,
leave me alone.
I'm having a staff meeting.



Who are we?



Nina Huittinen
The prof



Mathias Ellwanger
Staff scientist



Jacqueline Grewe
Chemical-technical assistant



Falk Wenzlaff
Chemical-technical assistant



Daniela Doppelstein
Secretary, also AG Müller



Julien Marquardt
Postdoc



Luiza Braga Ferreira dos Santos
Ph.D. student



Kevin Stuke
Shared Ph.D. student
@Forschungszentrum Jülich



Susanne Rupf (AG Abram)
Postdoc and radiation safety officer



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

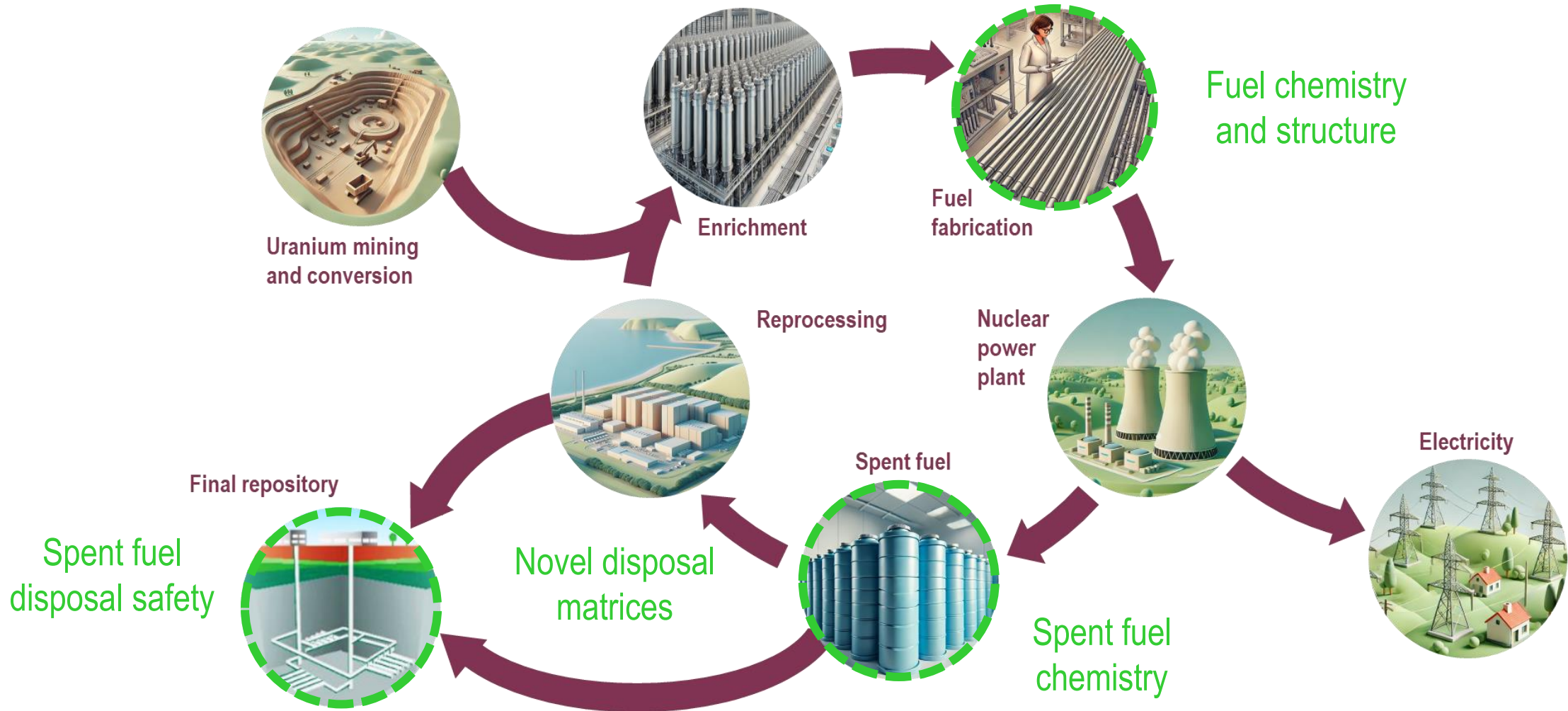


What do we do? – Teaching

- Fundamentals of Radiochemistry (lecture + lab)
- Inorganic Chemistry III: Modern Inorganic Molecular and Solid State Chemistry (every summer term)

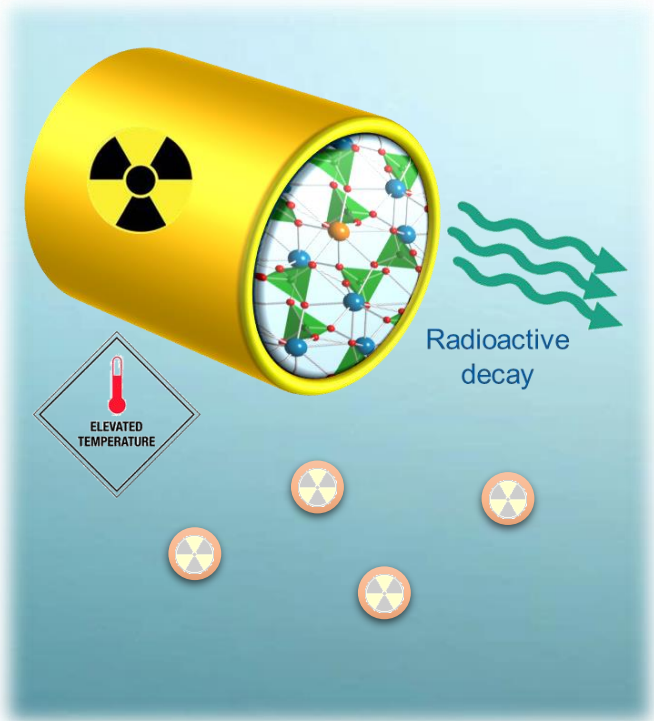
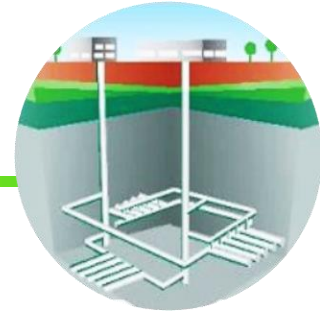
- Coming up
 - Radiochemistry (lecture module), every winter term starting in WS 2025/2026
 - Radiochemistry (practical module), every summer term starting in SS 2026
 - Radiation safety module (lecture+lab), every winter term starting in 2026/2027 (required to become radiation safety officer)

What do we do? – Research

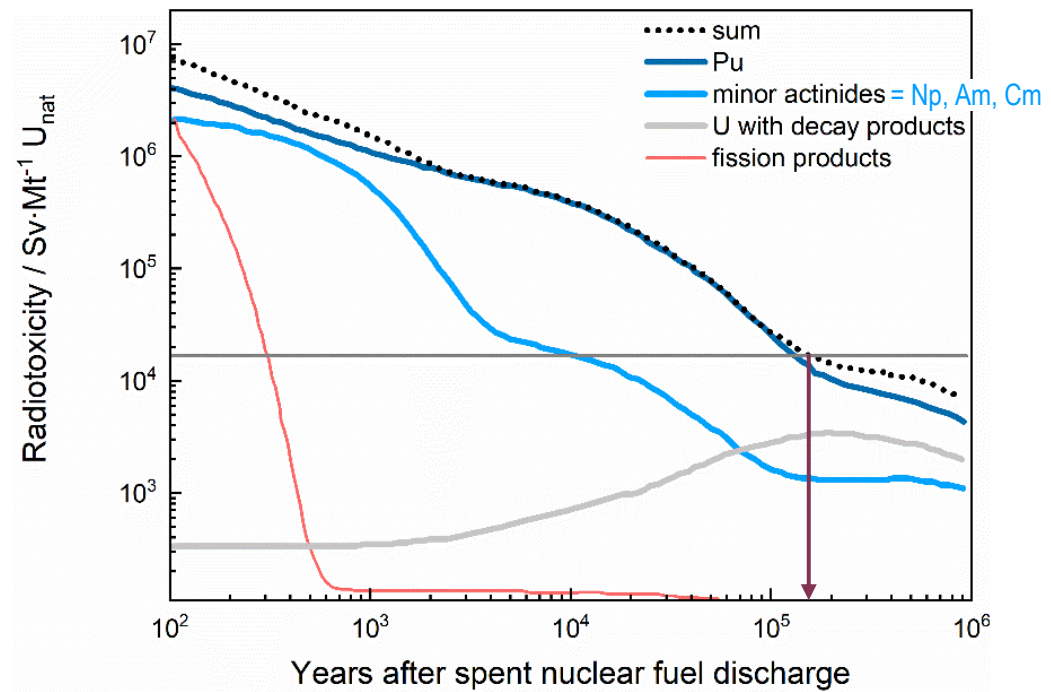
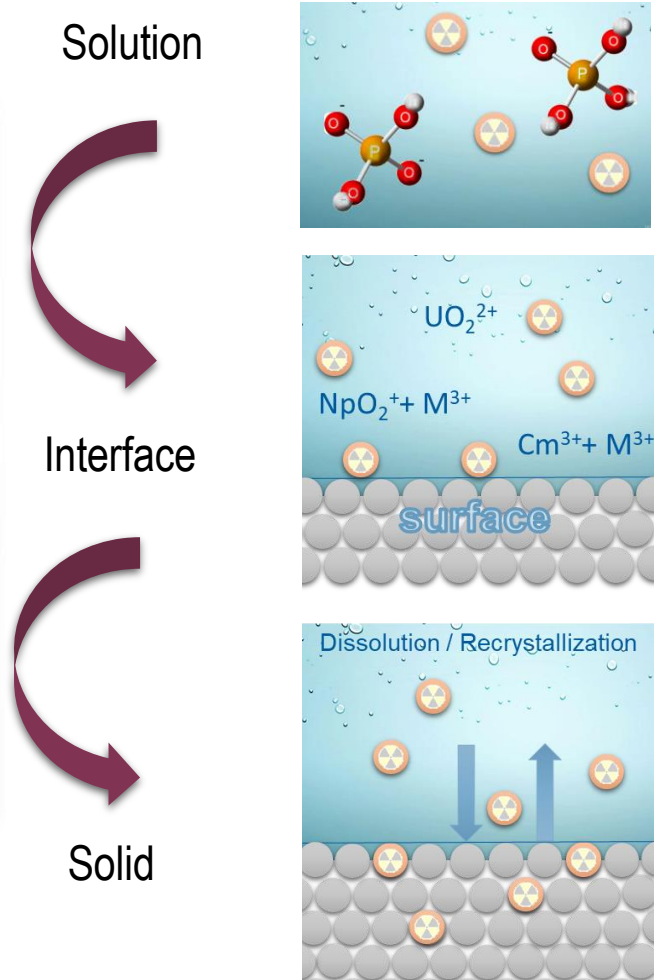


What do we do?

Spent fuel disposal safety

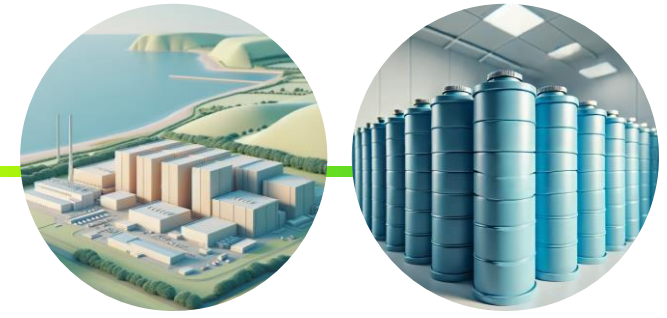


actinium 89	thorium 90	protactinium 91	uranium 92	neptunium 93	plutonium 94	americium 95	curium 96
Ac	Th	Pa	U	Np	Pu	Am	Cm
[227]	232.04	231.04	238.03	[237]	[244]	[243]	[247]

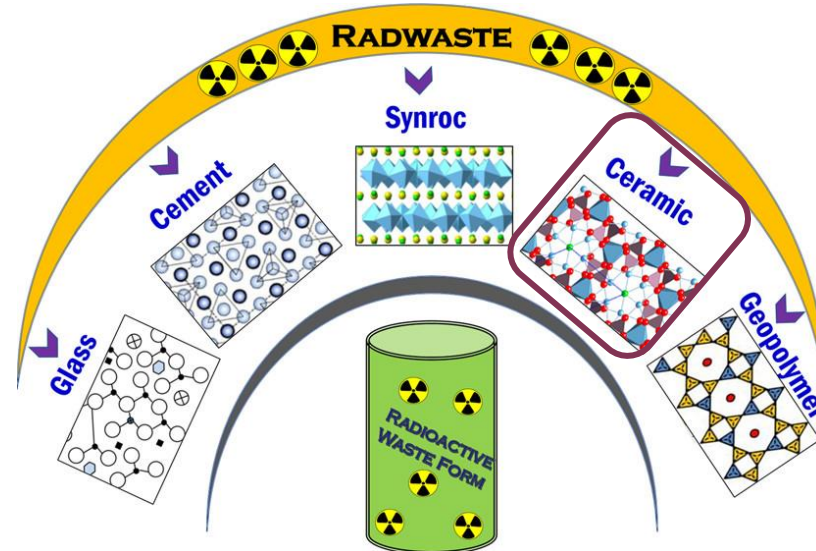
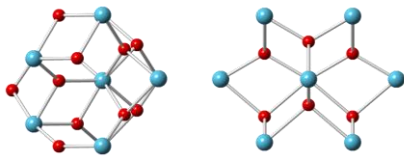
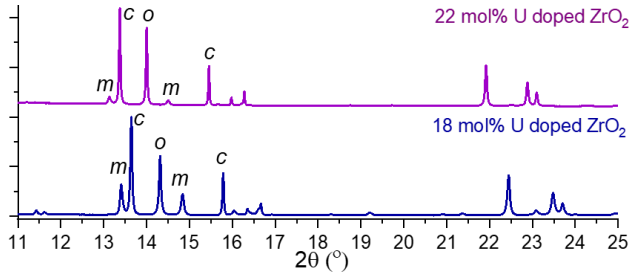


What do we do?

Novel disposal matrices

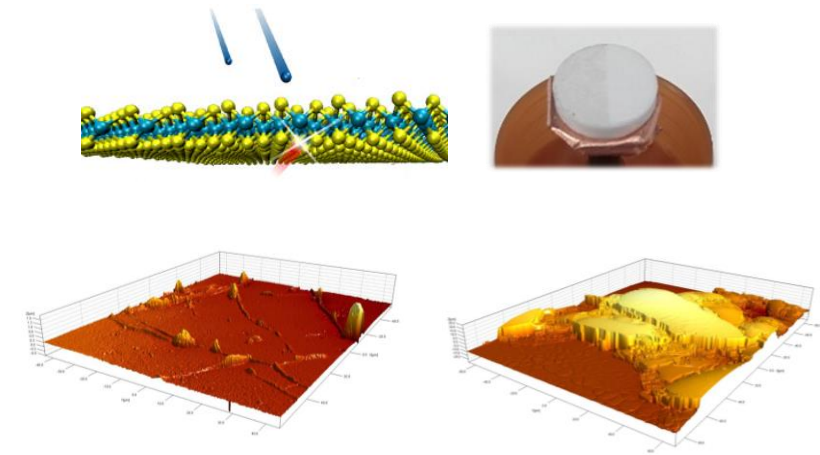


Composition



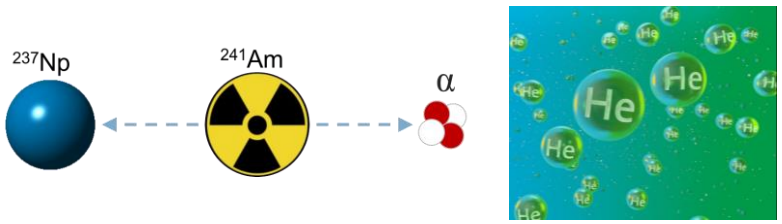
Singh et al. (2021) ACS EST Engg. 1, 1149–1170

Radiation tolerance

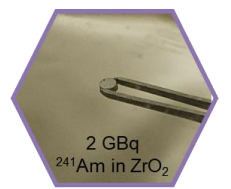
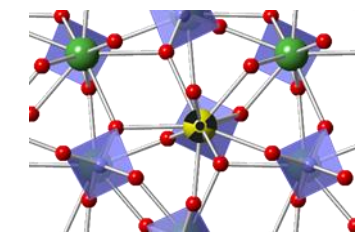


Gilson et al. (2024) npj Mater Degrad 8, 83

Pressure build-up



Clark et al. (2021) Sci Rep 11, 4512



What do we do? – Chemistry and spectroscopy

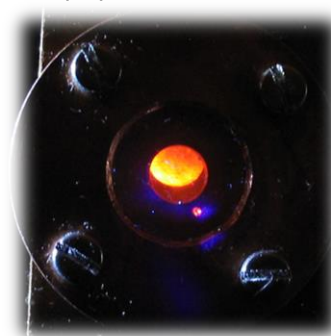
Luminescence spectroscopy

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

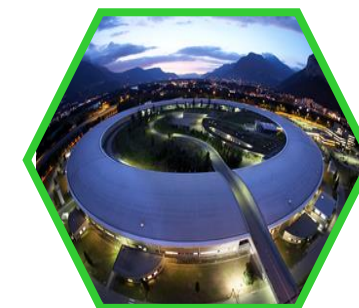
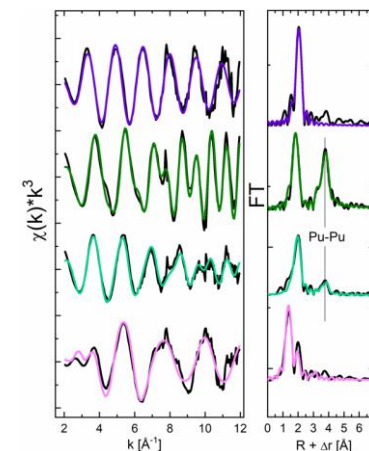
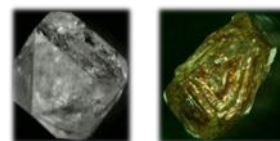
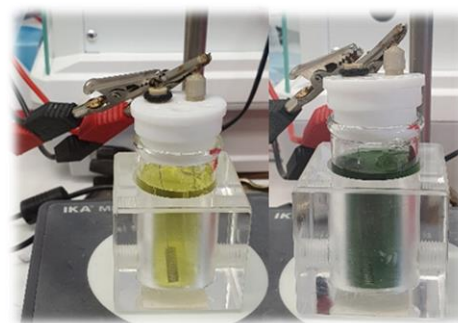
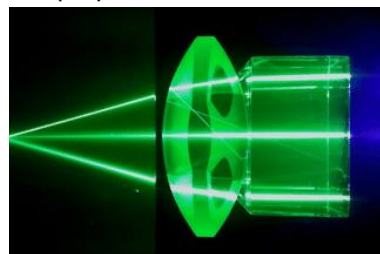
Eu(III) luminescence



Cm(III) luminescence

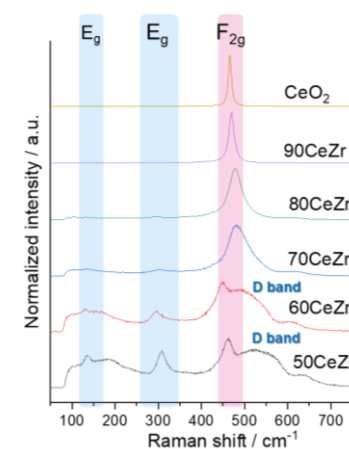


U(VI) luminescence

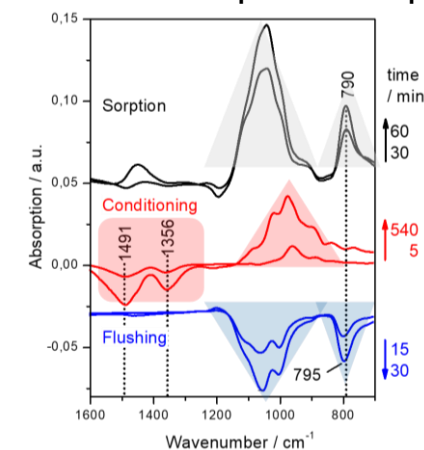


X-ray absorption spectroscopy

Raman spectroscopy



ATR-FT-IR spectroscopy

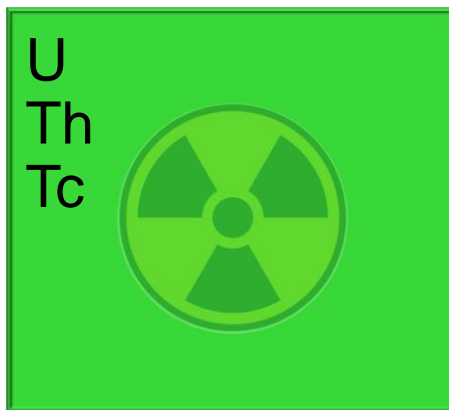


Equipping the lab

Glovebox



Furnaces



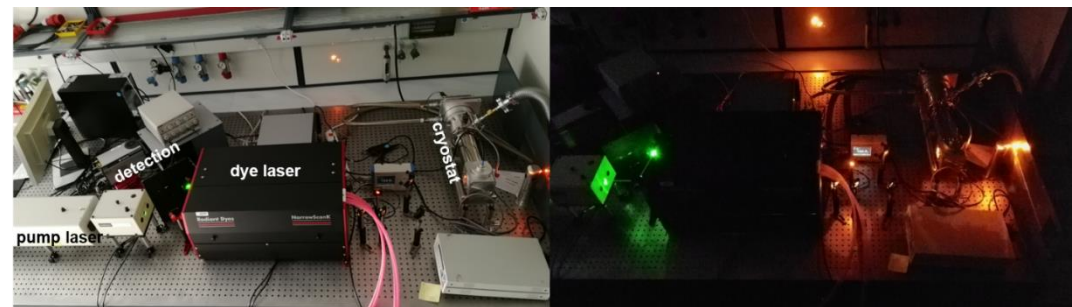
ESEM



Diffractometer



Tunable laser set-up



What can we offer



- 1 Ph.D. position will be announced beginning of next year
 - Radiation damages and ceramic waste forms
- 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)
 - Electronic structure calculations of actinides in solids (with AG Paulus) (@FUB)
 - Crystal structures of Zr and Re/Tc oxide and silicate solid solutions (@FUB)
 - Eu(III) complexation with myo-inositol hexakisphosphate (InsP6) (with AG Keller) (mainly @HZDR)
- Want to hear more? Come and visit us at the poster!

