

Personal information

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Ongoing Education A Master Degree Candidate at the Faculty of Engineering,
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Project information

Title Irradiation Testing of Nuclear Ceramics and Oxides
with Heavy Ions of Fission Fragment Energy

Lab Flerov Laboratory of Nuclear Reactions

Supervisor V.A. Skuratov



Introduction

- Radioactive nuclear waste
- Plutonium and actinides

Plutonium half life: 24,100 years

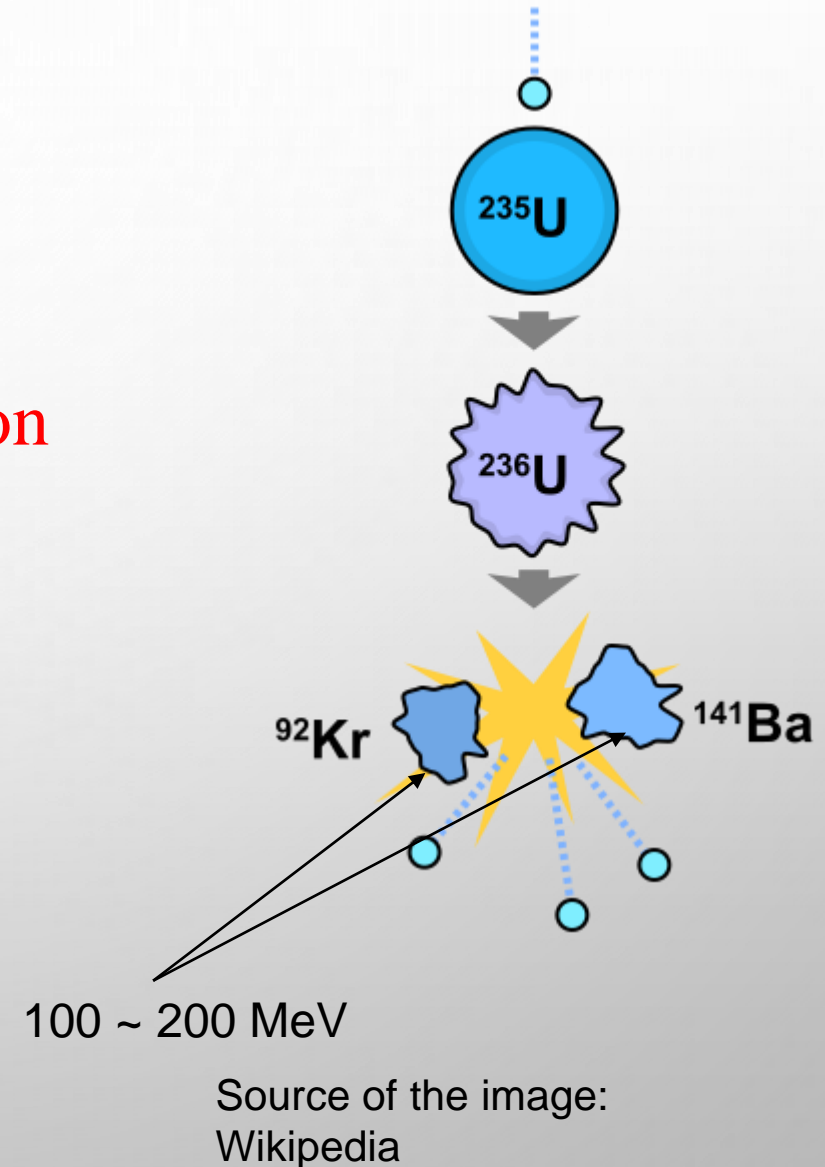
Minor actinides: several hundred and thousand years

- Transmutation
- Inert matrix for the immobilization of Pu and minor actinides



Inert matrix should be ...

- Transparent to neutron flux
- High thermal conductivity
- High thermomechanical resistance
- Good behavior under **irradiation** by fission fragments

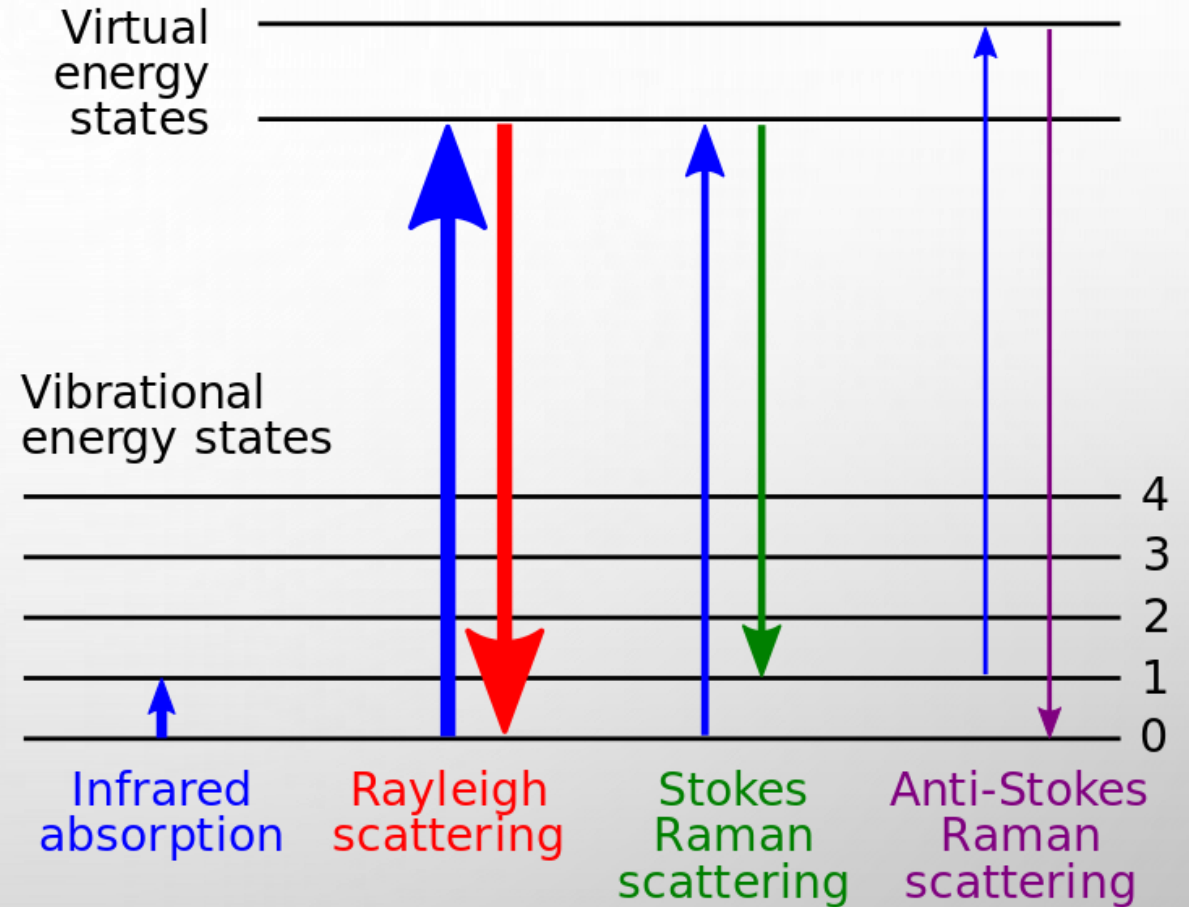


Raman Spectroscopy

$$\nu_l = \nu_r$$

$$\nu_l = \nu_s - \nu_{1-0}$$

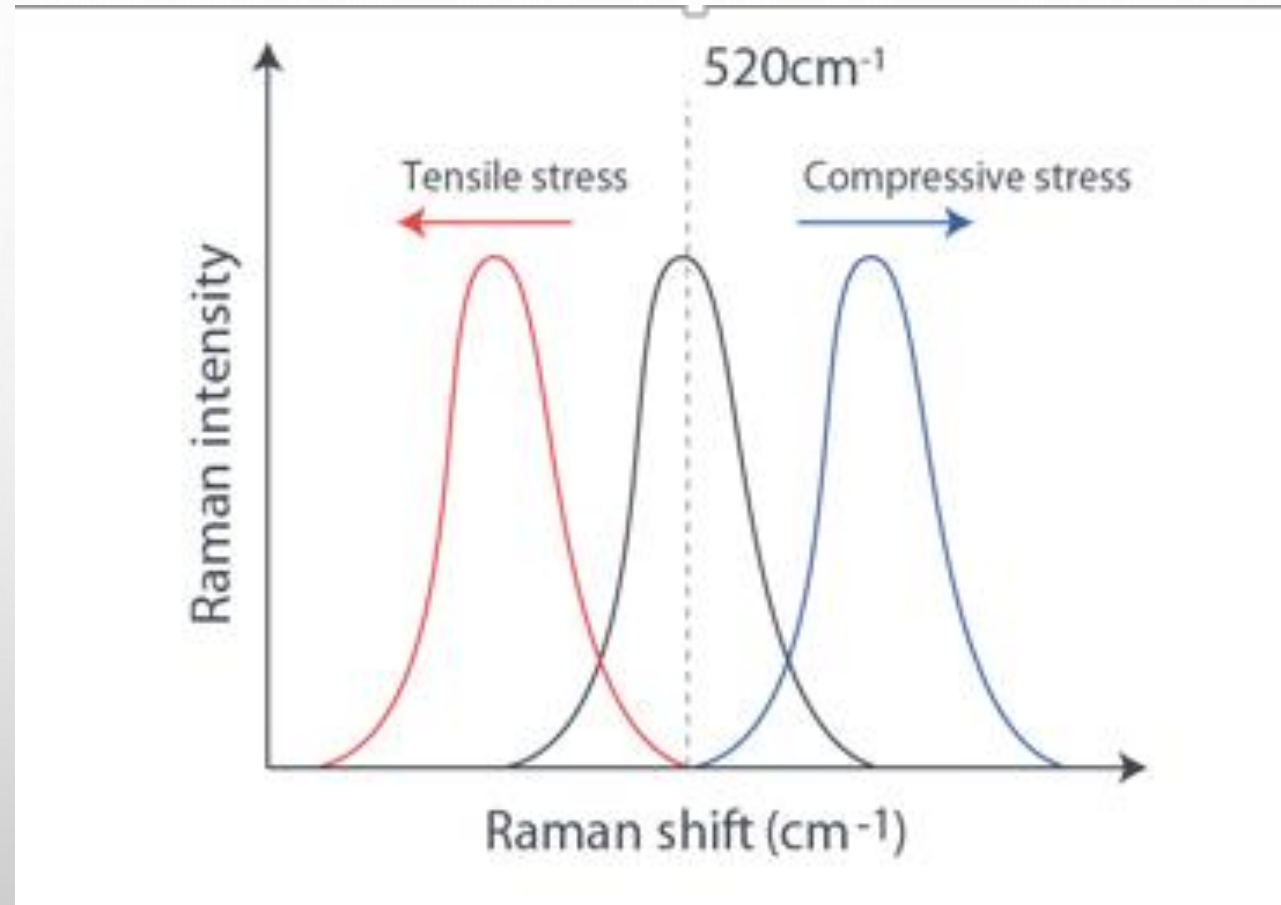
$$\nu_l = \nu_{a_s} + \nu_{1-0}$$



Source of the image:
Wikipedia



Raman Effect



Experiment

Laser Microscope

Laser wavelength: 473 nm

Scanned Area: 320 x 8 μm

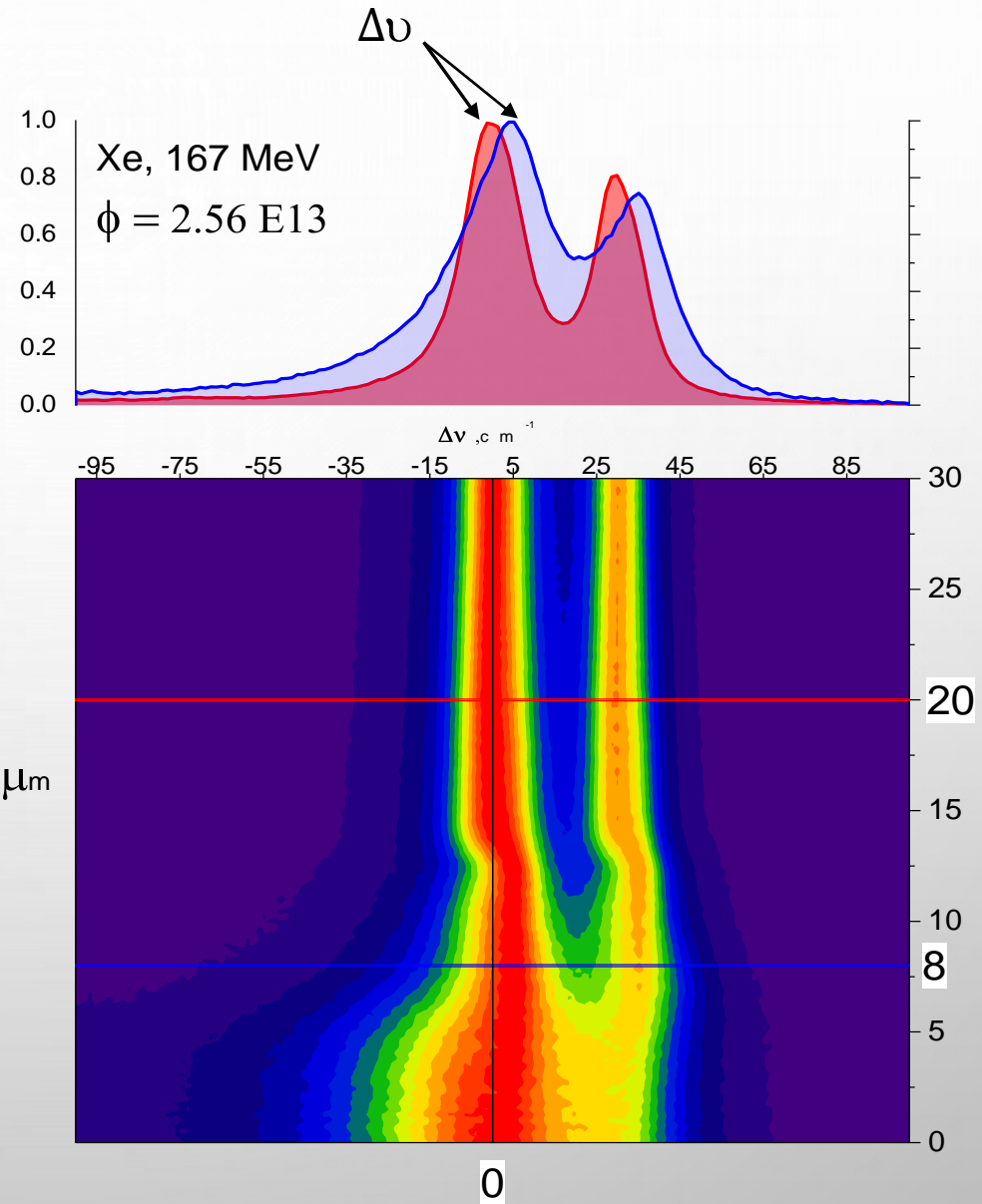


Results and discussion

Depth-resolved photoluminescence

$$\sigma_h = \Delta\nu / 7.61$$

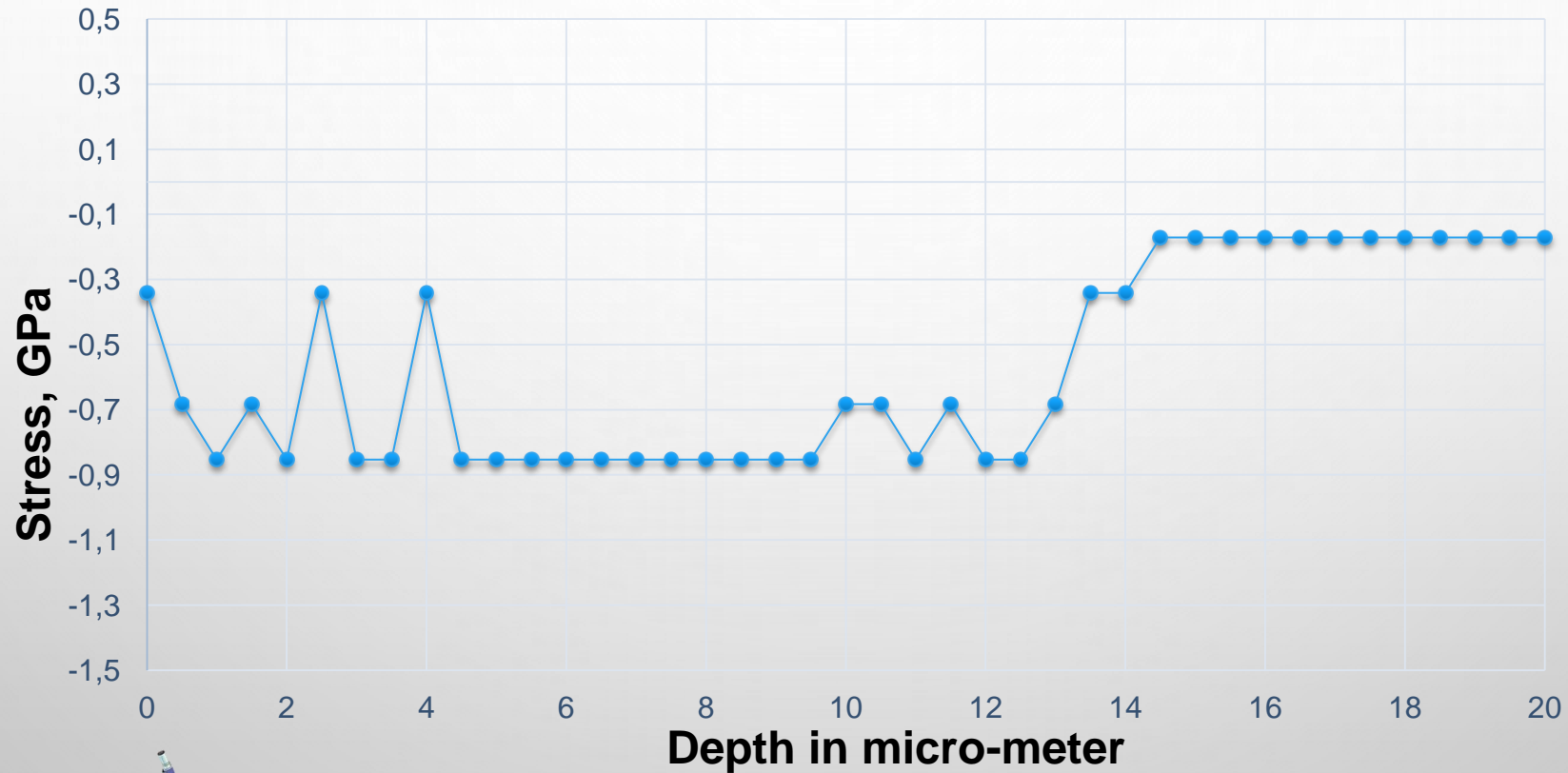
- σ_h : Stress (GPa)
- $\Delta\nu$: Raman peak shift (μm)



Results and discussion

Depth-resolved photoluminescence

Stress value (Gpa)



Thank you!

