PAUL SCHERRER INSTITUT

PSI

A. Nastruzzi, M. A. Pouchon, J-C. Chen :: Paul Scherrer Institute

Study on the origin of irradiation creep

Nuclear Engineering Master students
Introduction at PSI – 17.05.2021

Project outlines

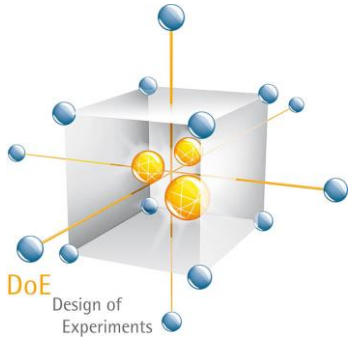
Semester project + Master thesis

(10.21 – 12.21) *(02.22 – 08.22)*

/TOPIC/

Study the **thermal diffusion** in stainless steel samples after **deposition of Nickel powder**.

1) **Samples preparation** and **DoE analysis** of Ni deposition
2) **Thermal treatment** for thermal diffusion
3) **Secondary Ion Mass Spectrometry** (SIMS) or **Rutherford Backscattering Spectrometry** (RBS) depth profiling and diffusion measurement
4) **Curve fitting** for extracting thermal diffusion coefficient

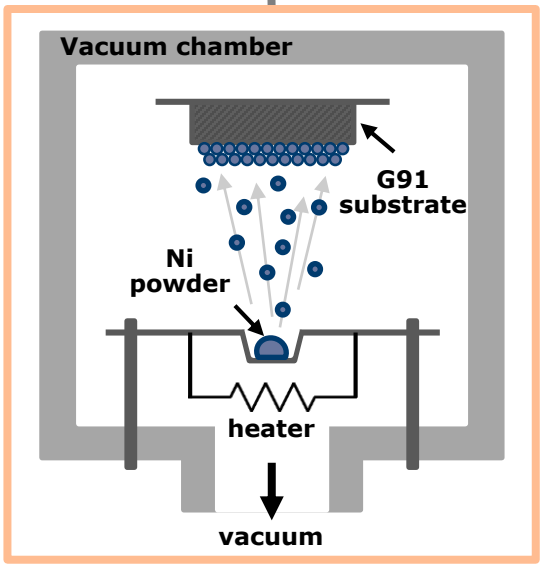


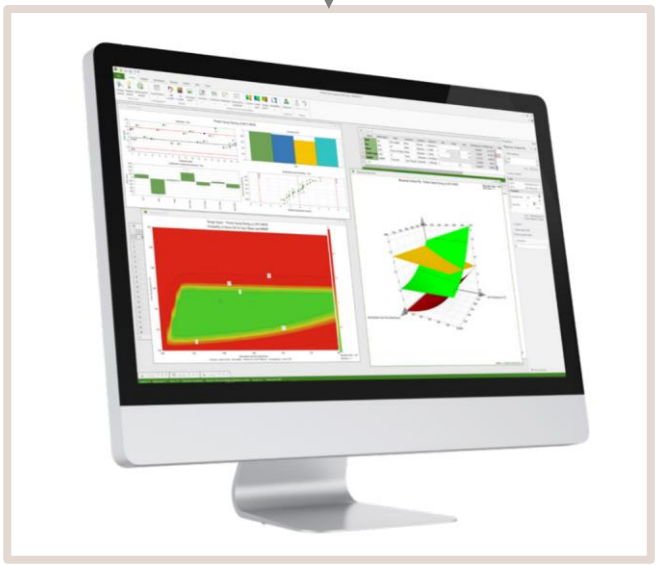
Setting of deposition parameters

DoE analysis
Design of Experiments

Most cost-efficient way to design effective experiments and **increase productivity**

Reduce the number of required experiments for setting the deposition parameters



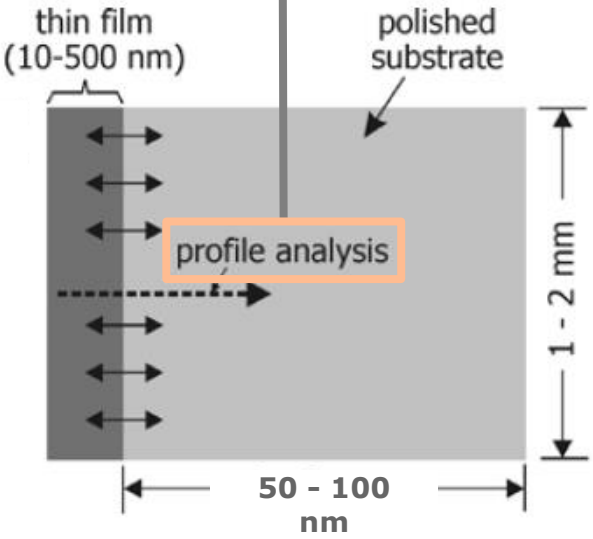


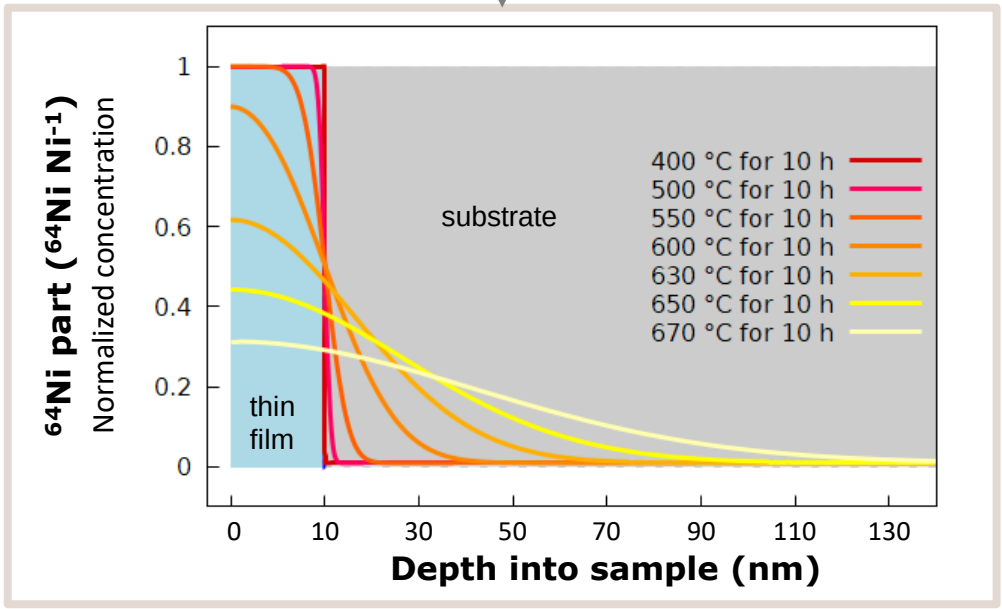
Extraction of thermal diffusion coefficient

SIMS or **RBS**
Spectrometry

→ High-resolution depth-profiling method

→ **Characterization of short diffusion profile** and **extraction of thermal diffusion coefficient**





Administrative details

Study on the origin of irradiation creep

/Working plan/

1) Literature review on the thermal diffusion and available database for define what of missing region;
2) Evaluation of the best design matrix in the DoE experiment;
3) Sample preparation, including Ni deposition;
4) Experimental measurements of the thermal diffusion coefficient by SIMS or RBS spectrometry;
5) Curve fitting for extracting the diffusion coefficient.

/Supervisors/

Anna Nastruzzi, PhD student
LNM senior scientists

/Output and Results/

1) Extraction of the thermal diffusion coefficient;
2) Contribution towards the scientific mystery on mechanism of irradiation creep;
3) Open new window for better understanding the irradiation creep model;
4) Analysis and Publish results in scientific literature.

/Contacts/

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Wir schaffen Wissen – heute für morgen

/Thanks for the attention/