Jules L'Hostis

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Research Interest

I am a researcher interested in **metallurgy** and **microstructure**, with expertise in deep **material characterization** and **phase-field simulations** for microstructure evolution. I would like to pursue investigating the relation between experimental observations and computational modeling to better understand the structure of materials.

Education

Centrale Lille — *Villeneuve d'Ascq, France*
PhD in Materials Chemistry — *Sept 2021 – present*

- Thesis: "Microstructure evolution during wire-arc additive manufacturing of a martensitic stainless steel: coupling between experience and modelisation", under supervision of Marie-Noëlle Avettand-Fènoël and Ludovic Thuinet

Polytech Lille — *Villeneuve d'Ascq, France*
Dipl. Ing. in Materials Science — *2016 – 2021*

- Engineering school, 2018-2021
  - Final year project with the CEA (Saclay): grain size reduction under severe plastic deformation in 316L steel
- Preparatory classes PEIP, 2016-2018

Experience

PhD Candidate — *Villeneuve d'Ascq, France*
UMET - UMR CNRS 8207 — *Sept 2021 – present*

- **Study of the evolution of the microstructure of a martensitic stainless steel during wire-arc additive manufacturing (WAAM) by experimental characterization and phase-field simulations**
- **Complete multiscale characterization of WAAMed thin walls** to understand the microstructure formation mechanisms during the building process:
  - Microstructure overview: OM, XRD, dilatometry, SEM, EBSD, TEM, APT
  - Post-processing of EBSD maps: grain size statistics, parent austenite grain reconstruction with MTEX
  - Mechanical testing: hardness, tensile tests
- **FORTRAN phase-field code adaptation and developpement** for the coupled modeling of the martensite transformation and the diffusion of carbon during AM thermal cycles:
  - Full CALPHAD description of phases for temperature and composition dependencies using an open-source database
  - 2 Bain variants martensitic transformation simulation with clamped or stress-free boundary conditions
- **Teaching & Supervision:**
  - Supervision of a 5th year engineer intern for 4 months
  - Teaching assistant at Polytech Lille: delivery of lecture on "Material and energy balances for industrial processes" to 3rd year students (2h), tutoring (6h) and exam grading
- **Scientific communication:**
  - 2 oral presentations at national and international conferences
  - Writing and submission of an experimental research article, and writing of a modelisation research article
  - Organisation and presentations at internal seminars with non-permanent staff
  - Participation in the organisation of the *Matériaux 2022* congress in Lille

Intern (5th year) — *Villeneuve d'Ascq, France*
UMET - UMR CNRS 8207 — *Mar 2021 – Sept 2021*

- Phase-field modelling of microstructure evolution in a martensitic stainless steel during an additive manufacturing process

- Adaptation of a FORTRAN phase-field code for 2 Bain variants martensitic transformation

FabLab Manager — *Villeneuve d'Ascq, France*
Fabricarium de Polytech Lille — *May 2019 – Apr 2021*

- Teaching machine operation (3D printer, laser cutter, digital embroidery machine)
- Providing project support and guidance

Intern (3rd year) — *Tourcoing, France*
KHERYS Group — *June 2019 – July 2019*

- Realization of the assembly manual and design of structural elements of a 3D printer

Skills

Languages:

- **English:** fluent, C1 level, 960/990 TOEIC score in 2020
- **Spanish:** basic proficiency, A2 level
- **French:** native, maternal language

Computer Skills:

- **Software & tools:** LaTeX (★★★), Office suite (★★★), GIMP/Photoshop (★★★), Inkscape/Illustrator (★★★), Fiji (ImageJ) (★★), Gnuplot (★★★), Matplotlib (★★)
- **CAD & Materials Science:** ANSYS Workbench (★), GRANTA (★), CATIA V5 (★★), Fusion 360 (★★), Thermo-Calc (★★★), DICTRA (★), Aztec Channel 5 (★★★), MATLAB (★), MTEX/ORTools (★★★)
- **Programming Languages:** Python (★★★), C (★), FORTRAN (★★), Bash (★★)

Materials Science Skills:

- **Micoscopy techniques:** OM (metallography), SEM (BSE, EDX), EBSD (sample preparation, post-processing with MTEX), TEM (STEM, EDX-STEM, sample preparation via electropolishing)
- **Material characterization:** XRD, Vickers micro-hardness, tensile testing

Interest

Graphic design: drawing (traditional and digital media); production of posters and T-shirts

Rock dancing: President of Polytech Lille's Rock Dance Club (~ 70 persons)

Publications

(*Under review*) Multiscale characterization of WAAMed martensitic stainless steel: correlation between experimental AM thermal cycles, microstructural evolution and mechanical properties, *Acta Materialia* — *Oct 2024*
J. L'Hostis, L. Thuinet, E. Cadel, MN. Avettand-Fènoël

(*To be submitted in March 2025*) Phase-field modelling of microstructure evolution during complex thermal cycles: application to martensitic steels, *Acta Materialia*
J. L'Hostis, MN. Avettand-Fènoël, M. Bonvalet-Rolland, L. Thuinet

Conferences

Phase-field modelling of microstructure evolution during complex thermal cycles: application to martensitic steels, *Multiscale Materials Modelling (MMM11)* — *Praha, Czech Republic, Sept 2024*
J. L'Hostis, MN. Avettand-Fènoël, L. Thuinet

Microstructure evolution in a wire-arc additively manufactured martensitic steel, *Matériaux 2022* — *Lille, France, Oct 2022*
J. L'Hostis, MN. Avettand-Fènoël, L. Thuinet