Title	*Internship position - Master 2 or equivalent* Microstructure and properties of NbC-based alternatives hardmetals
Main host laboratory	SIMaP, Science, Engineering, Materials and Processes, Université Grenoble Alpes (UGA) https://simap.grenoble-inp.fr/en
Field of expertise	Materials Science
Context	A hardmetal is a composite material, manufactured by powder metallurgy route, that combines the high hardness of a hardphase (usually a carbide), with the ductility of a metallic binder. Currently, the combination WC-Co is by far the most used one. However, the material that revolutionized the tooling industry a few decades ago is nowadays facing an enormous challenge: the need to replace Co as binder according to a reclassification by REACH (European Chemical Agency) due to its toxicity and environmental issues. Within the ANR project "HardmetMAP", we aim to stablish a fruitful collaboration between groups that would cover expertise on production, advanced microstructural analysis, mechanical characterization and modelling. We propose to explore the field of alternative hardmetals (i.e. containing alternative binders and/or alternative hardphases) starting from a fundamental understanding on the chemical and microstructural parameters that control the mechanical properties, and then using this information to "tailor" the composition of novel materials to provide the required properties for a targeted application.
Description	After selection of promising NbC/binder combinations, hardmetal samples will be produced using powder metallurgy route in conditions close to industrial one. Afterwards, a detailed microstructural study will be carried out as follows: - Shape, morphology and distribution of the hardphase, binder phase, secondary phases and porosity will be observed using SEM (Scanning Electron Microscopy). - Hardphase grain size distribution and contiguity will be determined from EBSD micrographs (Electron BackScattered Diffraction) and the faceted/rounded character of hardphase/binder interfaces will be quantified. Grain growth mechanisms will be analyzed for NbC-based hardmetals, using binders with different chemical compositions. The study will consider the effect of binder chemistry, carbon content, binder volume fraction, as well as the sintering time (kinetics). The effect of grain size and binder content on hardness will be analyzed for selected combinations of materials. *The project is based on a strong collaboration with PhD students at SIMaP and TU Wien. One scientific stay (1-2 months) is planned at TU Wien where samples will be produced.*

Candidate profile and skills	Education level: Master of Science 2 or Engineering school The candidate, motivated by scientific research, should have a sound knowledge in Materials Science and particularly in Metallurgy. Knowledge of microstructural characterization techniques is essential. Technical English is also required. In addition to his/her scientific skills, the candidate must be able to work in a team, but also have a degree of autonomy.
Starting date and allowance	The internship will start in January or February 2026 and will be funded in the frame of a collaborative research projects between Austrian and French laboratories for a period of 6 months (ANR-23-CE08-0039-01). Accommodation and travel costs during stay at TU Wien will be covered. Internship allowance will be provided.
How to submit an application?	☐ Detailed CV (maximum 3-page) ☐ Motivation letter (maximum 2-page) ☐ Transcripts of Bachelor and Master's degrees (including the grade range) ☐ Any additional files considered relevant to the application *Please, send the documents to Celine.Pascal@simap.grenoble-inp.fr* *In doing so, indicate as email's subject "MASTER INTERNSHIP APPLICATION", and pack all required information in one single PDF file, using a file name with the following format: surname_name.pdf*