

## Job Offer - Research Engineer - 6 months

### Supercritical CO<sub>2</sub> applied to textile dyeing

**Profile:** Engineer in Chemical Engineering

**Job localization:** Laboratory «Mechanics, Modeling and Clean Processes» (UMR 7340 CNRS), Aix Marseille Univ, CNRS, Centrale Marseille, M2P2, Marseille, France - Europôle de l'Arbois BP 80, Bat. Laennec Hall C, 13545 Aix-en-Provence Cedex 4, France

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**Duration:** 01/09/2021-28/02/2022

**Monthly net salary:** 1580 €

**Context and objectives:** Meeting the requirements of sustainable development and circular economy, the integration of supercritical processes in industry is becoming an expanding reality in several application fields.

In the field of textile finishing, dry supercritical CO<sub>2</sub> dyeing technology is a very promising alternative to conventional aqueous processes. Indeed, the use of supercritical CO<sub>2</sub> as a solvent eliminates water consumption and subsequent processing steps which present a real problem in aqueous processes. Furthermore, the production cycle time can be significantly lower in supercritical CO<sub>2</sub> dyeing process. As the separation of gaseous CO<sub>2</sub> at the end of the process is spontaneous, drying operation are avoided allowing thus an energy saving. Additionally, in an industrial scale, the CO<sub>2</sub> can be recycled at the end of the process and the dyes in excess in the process can be recovered and recycled. Even if this technology is now applied at an industrial scale for synthetic textiles (notably polyester), several challenges remain for natural textiles.

In this context, this job offer is part of a collaboration between a leading European manufacturer in the narrow textile field and the M2P2 (Mechanics, Modeling and Clean Processes) laboratory of Aix Marseille University (UMR 7340 CNRS), for the study of the supercritical dyeing process.

The work will be carried out within the “Supercritical Fluids and Processes” team of the laboratory M2P2, which is specialized in processes using supercritical fluids and more specifically in supercritical CO<sub>2</sub> for 25 years.

**Tasks:** This study is focusing to apply and optimize the supercritical process for dyeing textiles of different chemical, on a laboratory scale. A state of the art of suitable textile dyes and supercritical dyeing processes will be established in a first part of this work. Using an experimental set-up already available at the laboratory, the engineer will be responsible for proposing and developing the appropriate process according to the selected dyes, considering a subsequent scale-up of the process to industry. More precisely, the process should be optimized to meet the criteria for dyeing in the textile industry (in terms of colorimetry, color fastness and mechanical strength). All these characterizations will be carried out by the industrial partner involved in this study.

**Candidate skills:** Engineer in Chemical engineering. Rigorous with a capacity for synthesis and adaptability. An experience in the field of high-pressure processes will be an asset.