

Title of the thesis	Micro-Electronic Assisted flax dew retting
Acronym	FlaxTronic
Reference number	003

Hosting institution	Employer
Université de Lille Website: https://www.univ-lille.fr/home/	CNRS Website: http://www.cnrs.fr/en
Hosting research unit 1	Hosting research unit 2
Name: Unité de glycobiologie structurale et fonctionnelle Acronym: UGSF Identification number: UMR 8576 Address: Cité Scientifique Campus - Bât. C9 59655 Villeneuve d'Ascq Website: http://ugsf-umr-glycobiologie.univ-lille1.fr/	Name: Institut d'électronique de microélectronique et de nanotechnologie Acronym: IEMN Identification number: UMR 8520 Address: Cité Scientifique Campus Avenue Henri Poincaré CS 60069 - 59 652 Villeneuve d'Ascq Website: https://www.iemn.fr/
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Thesis information	
Keywords	Bioeconomy, Plant Fiber, Retting, BioMicroelectromechanical (BioMems), Biosensors.
Abstract	<p>The successful transition to a bioeconomy requires the substitution of petro-based resources by renewable bio-resources. Natural plant fibers will play an increasingly important part in this transition via their utilisation in diverse textile and composite materials. Flax (<i>Linum usitatissimum</i> L.) is one of the best-known sources of natural fibers and is an economically important fiber crop in France with a production in 2015 approaching 861 kt natural fibers of which about 84 % is used for fabrics and the rest for composite materials. In 2018, its culture occupied 106,146 ha in France representing 83% of the agricultural surface dedicated to plant fibers. Industrially, the flax fibers must be dissociated from the rest of the stem by a succession of processes beginning with the crucially important step of retting that facilitates this separation. The retting process is an extremely complex natural phenomenon that is affected by many different interacting factors that render its management difficult. Both under-retted and over-retted fibers show non-optimal physico-chemical properties and are therefore of lower industrial quality, as are the unevenly retted fibers that also result from an imperfect retting. The two main partners of the FlaxTronic project (UGSF & IEMN labs) are aiming to acquire multi-scale data sets consisting of the farmer's empirical quality evaluation, meteorological conditions, biological information and mechanical, chemical and physical characterization of flax fibers during retting. Statistical processing of these data will lead to the identification of key markers that will constitute an "intelligent toolbox" that will allow farmers to follow and objectively characterize the maturation (and hence quality) of the flax fiber during retting. Selected key markers will then be used to develop preliminary smart sensors within the framework of this project and in close collaboration with another related project (VAL: Vegetronic applied to flax) that also involves the two main partners of the</p>

	<p>FlaxTronic project. The FlaxTronic PhD subject is an interdisciplinary project contributing to the convergence of the Hub 2 (Science for a changing planet) and Hub 3 (Human-friendly Digital World) themes. By identifying significant data resulting from multi-scale biological, physical and chemical data that can be embedded on a communication chip it will represent a practical proof of concept of the so-called agriculture 4.0. The FlaxTronic subject will involve close cooperation with the flax industrial sector (Van Robaeys Company, 1-month secondment) and the textile/materials industry (GEMTEX lab, ENSAIT, 1-month secondment). The project will also involve an international collaboration with the Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB, 1 month secondment).</p>
Expected profile of the candidate	<p>The candidate will hold an engineering degree or a research master's degree in plant biology and/or biostatistics. Skills in microscopy and biochemistry are required. Enthusiasm and experience in statistical analyses will be highly appreciated (e.g. mastery of the R environment). During her/his courses, the student must have demonstrated an aptitude for experimental research, autonomy, thoroughness, curiosity, teamwork and demonstrated good communication skills (both oral and written, in English).</p>
Application procedure & Eligibility criteria	<p>The application procedure and eligibility criteria are detailed on the European doctoral programme PEARL website www.pearl-phd-lille.eu. The funding is managed by the I-SITE ULNE foundation which is a partnership foundation between the University of Lille, Engineering schools, research organisms, the Institut Pasteur de Lille and the University hospital.</p> <p>The application file must be submitted before March 31, 2021 (10:00 AM - Paris Time) and emailed to the following address : international@isite-ulne.fr.</p>
Net salary and Lump Sum	<p>A net salary of about €1,600 + €530 per month to cover mobility, travel and family costs.</p>