



PhD position offer at Kasetsart University, Thailand

Study of the biochemical and mesostructural dynamics during natural rubber coagula maturation and impact on rheological properties

A PhD position for a candidate keen to collaborate internationally at the public-private sector interface in a good scientific environment and to be involved in the study of a bio-product of high economical importance for ASEAN countries

Context and Scientific program

Natural rubber (NR) produced by *Hevea brasiliensis* which represents 40% of the elastomer world market is mainly commercialized in the form of dry rubber bales of Technically Specified Rubber (TSR). Those NR bales are made from cup coagula that were harvested and matured before being processed. The main drawback of this unique biopolymer is the variability of its quality. Controlling this variability by understanding the mechanisms occurring from the latex harvest to the raw rubber product ready to be exported would support NR in its competition with petroleum sourced synthetic rubbers.

The scientific program of the proposed PhD will be focused on an integrated approach where several scales of study will be involved (biochemical composition of non-isoprene, macromolecular structure, and bulk properties) in order to follow up dynamics of various indicators under different strictly controlled maturation conditions. A special attention will be addressed on the two major mechanisms that impact the mesostructure (macromolecular chains and gels) namely scission and crosslinking of the poly(*cis*-1,4-isoprene). The equilibrium point between those two antagonistic mechanisms is most probably settled during drying and will depend, among other, on the conditions and duration of preprocessing maturation process that NR cup coagula are submitted to. This equilibrium will impact the mesostructure of raw material and its rheological properties. Scissions linked to the oxidation of the macromolecule seems prominent (Dramatic drop of PRI is observed during early stage of maturation at constant standard drying conditions). The proposed PhD work will be dedicated to study the causes of this scission by monitoring several sets of controlled maturation experiments.

International Partners of the project

Kasetsart University

Kasetsart University is the first agricultural university and the third oldest university in Thailand. It was established in 1943, to promote subjects related to agricultural science. Since then, it has expanded its subject areas to cover economics, business administration, veterinary medicine, engineering, science, social sciences, humanities, education, and architecture. The successful candidate will be enrolled in an international PhD program in Kasetsart University, Faculty of Agro-Industry .

CIRAD

CIRAD (French Agricultural Research Centre for International Development) is a French agricultural research and international cooperation organization working for the sustainable development of tropical and Mediterranean regions. CIRAD is a French public establishment (EPIC). CIRAD scientists conduct research on natural rubber for several decades and developed a strong partnership in Thailand (HRPP, Hevea Research Platform in Partnership).

LBTNR CIRAD KU Laboratory

The laboratory that will host the PhD student is LBTNR (Laboratory of Biochemistry and Technology of Natural Rubber), a joint international laboratory between Kasetsart University (KAPI) and UMR IATE (CIRAD). In addition, the PhD student will conduct analytical work in France (2-3 months/year). Though most of the study will be conducted in laboratories, sampling field work in rubber plantations will be regularly conducted.

Supervision team

This work will be co-advised by a senior CIRAD researcher (HDR) and a KU lecturer (PhD) in Thailand and supervised by a senior CIRAD researcher (HDR) in France.

Private Sector

This work is done in collaboration with and with the support of a leading tyre company. Regular interactions with them is expected from the PhD student (meeting, written exchange, reporting, etc...).

Financial condition

The budget of project includes a salary for the PhD Student of at least 20 kTHB /month. In addition, there is a possibility to apply for a KU scholarship for international student.

Expected profile

English language proficiency (written and spoken). The work load and the multipartner international framework would request an efficient communication which can not be impaired by English misunderstanding due to the language. Therefore, we will ask you to provide evidence of strong English language skills. Please include English language test results in your application. Such tests should not be older than two years at the time of application.

Knowledge/experience in the following scientific domains

(it is understood that no candidate could fit this broad domain profile) :

- Analytical biochemistry (advanced),
- Chemistry (esp. oxidation, advanced),
- Engineering/physics (practical sense/basic),
- Material science/Rheology (esp. polymer)
- Microbiology (basic),
- Data base management (basic)
- Statistical analysis, mathematical model (basic)

Academic level : Please provide last available transcripts (BSc, MSc) and publications if any.

Personal skills : the candidate should be open to international collaboration and therefore willing to experience cultural differences. The candidate should be motivated by the perspective of mobility, including regular stays in France (2-3 months/year). To conduct successfully this PhD study, and despite the constant support of the supervision team, the candidate is expected have and to develop cognitive abilities such as sound judgment, discretion, and autonomy.

Application

CV + Motivation Letter + Transcripts + Publications + English proficiency test + last written report done in the course of academic study (MSc thesis, MSc proposal, etc...) to be send in a Single PDF file to **laurent.vaysse@cirad.fr**

Schedule

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| 1. Application due date | JULY 01st, 2017 |
| 2. Interview of short-listed candidate | END of JULY 2017 |
| 3. Selection of the candidate | AUGUST 2017 |
| 4. Enrollment in Kasetsart University | OCTOBER-DECEMBER 2017 |
| 5. Project start | OCTOBER 2017 |
| 6. Starting of the PhD course | JANUARY 2018 |