European Project Semester

PROJECT OUTLINE

Project dates: March 2018 - June 2018

Title: Assembling process for power electronic modules using bio-based glue including electrical conductive elements

Project activity areas: Material sciences, bio-technology, power electronic

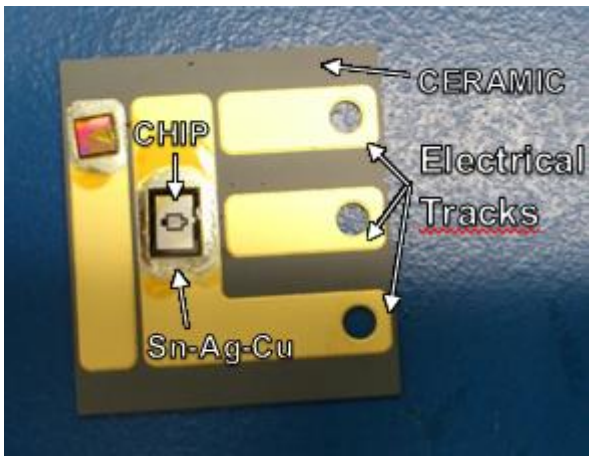
Keywords:
Bio-based glue, chemical physics analysis, mechanical and electrical tests

Tutor's name and coordinates
Client – End-user: LGP (research lab)
Technical ENIT Supervisor + contact:
Baptiste TRAJIN – baptiste.trajin@enit.fr
Tiphaine Merian – tiphaine.merian@enit.fr

Project origin
Research

Project technical background:

Embedded power electronic modules need more and more efficient materials that meet several specific functions. Nowadays, power electronic chips for railway or aerospace applications are brazed with metal alloy on electric power tracks using a hot temperature process. The considered brazing ensures a mechanical link between power tracks and power chips as well as conduction of high density current and thermal flux.



The main idea of the project is to replace brazing by a bio-based gluing with an adhesive including electrical conductive elements. Previous studies showed that commercial epoxy glue could be adapted for this application. Many mechanical and electrical tests have been performed to demonstrate the advantages of gluing. The challenge of this project is to keep mechanical, thermal and electrical properties of bio-based glue comparing to commercial glue.

Studied topics:
Following the number of students the tasks will be adjusted. The following stages are defined :

- Bibliographic analysis on bio-based glue

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- Choice of materials
- Define and realize chemical physics tests (DSC, rheometry, TMA…)
- Define and realize mechanical tests (adherence, contact angle, shear test…)
- Define and realize electrical tests (conduction…)

The possibility is offered to the students to use themselves many test equipments!
All these topics should be prepared and realized using a traceability and quality chart to allow further user (students or researchers) testing campaigns.

As far as the background required, an overall curiosity for multiphysic subjects is needed. A general understanding of electrical engineering would help a lot. Depending on the student background, some subjects could be more developed for instance :

- For mechanical engineers, the focus will be done on the mechanical analysis performed,
- For bio-technology engineers, the focus will be given on bio-based glue and their chemical physics properties,
- For electrical engineers, it is obvious…
- For others, we will find together something suitable.