

Master's thesis and project

"New additives in paper boards for transformers"

Cellulose insulation has been the preferred choice for the solid insulation in oil-filled power transformers for more than a century. This relates to the excellent electrical insulating properties of dry cellulose in conjunction with transformer oils. However, there are severe disadvantages of cellulose namely its hygroscopicity and tendency to decompose at high temperatures. In the course of decomposition, depolymerization takes place, leading to a loss in mechanical strength and, further, volatile compounds and water are formed which may lead to failure of the transformer. In order to avoid this, additives for thermo-upcycling have been incorporated into the cellulose materials, with DICY (dicyandiamide) being the most commonly used.



The major goals of this project are to better understand the action of DICY based systems in order to develop novel formulations which could be potentially used in thermal upgrading of paper. This involves to elucidate the reaction mechanisms of commonly employed upgrading additives, mainly DICY, and to determine which chemical functionalities are needed to realize thermal upgrading. In the end of the project, promising additives will be tested at lab scale. The methodology involves the modification of the paper boards and their characterization using state of the art analytical techniques such as electron microscopy and mechanical testing. The work will be conducted in close cooperation with an industrial leader in the field.

If you are interested to join a young dynamic team, feel free to pass by or to contact us via e-mail!

Stefan Spirk (stefan.spirk@tugraz.at)