One big problem with recycling and biofuel

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Researchers from Karolinska Institutet have developed a quick and non-destructive method to map the carbohydrates of plant matter. By making composition analysis more easy and accessible, this method will help to understand where inefficiencies lie in many processes from paper recycling to the production of biofuel and will eventually lead to less waste and higher quality output.

The team led by Professor Agneta Richter-Dahlfors at the Swedish Medical Nanoscience Center developed a molecular probe that binds to carbohydrates in the plant material and emits a distinct fluorescent spectrum depending on what it has bound. This can then either be detected via microscopy to produce detailed carbohydrate maps or via spectroscopy to give a numerical readout.

Professor Richter-Dahlfors has traditionally focussed on infection biology research at Karolinska Institutet however, when studying cellulose in the bacterium E. coli, she saw immediate parallels in plants. "This achievement was only possible by the way we managed to combine competences from different fields. Starting from research on bacterial biofilms, we added expertise in biomass polymer chemistry, and optoelectronic molecules to generate this new approach with potential to transform the workflow in research labs and industry" said Professor Richter-Dahlfors.

The hope is that this probe will shed light on processes in recycling and biofuel production that are currently inefficient. Often, the carbohydrate composition of material being used is unknown which makes the

processes very difficult to optimise. Quickly being able to measure the carbohydrate content would make it easier to optimise and produce higher quality end products with less waste.

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More information: Ferdinand X. Choong et al. Stereochemical identification of glucans by oligothiophenes enables cellulose anatomical mapping in plant tissues, *Scientific Reports* (2018). DOI: 10.1038/s41598-018-21466-y

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