



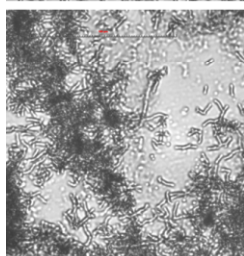
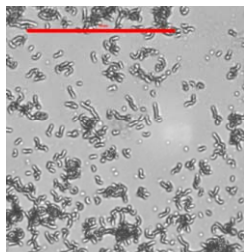
# Lignin for Triacylglycerol (TAG) Biosynthesis

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### PROGRAM DESCRIPTION

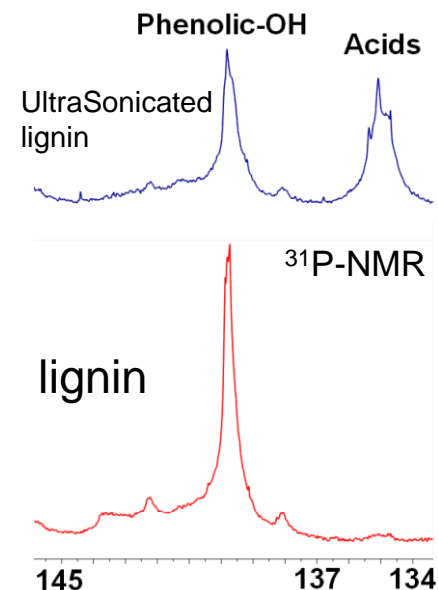
- Utilizing lignin and products derived from it like ultrasonicated lignin and pyrolysis oil to produce TAGs by fermentation with *Rhodococcus opacus* strains DSM 1069 and PD630
- Investigating metabolic pathways and their enhancement for better biodiesel-TAG production
- LignoBoost lignin (CO<sub>2</sub> precipitated black liquor) has already been characterized (*GreenChem 2010*)



DSM 1069 on lignin

### TECHNICAL DETAILS

- Shake flask fermentations with minimal media and given carbon sources: lignin model compounds and pyrolysis oil; Upscale to benchtop fermentor BioFlo 110 3L
- Functional group changes analyzed by qualitative <sup>13</sup>C- and quantitative <sup>31</sup>P-NMRs, molar mass changes by gel permeation chromatography (GPC), TAG analysis by TLC and GC



### PAYOFF

- Valorization of lignin products from both the pulp and paper industries and cellulosic ethanol production pretreatment streams
- The first goal is to use above strains natural trait to produce biodiesel precursor TAGs
- Later the detailed study of the biochemical pathways can lead to other products while converting lignin and pyrolysis oil into a precursor for biodiesel

### KEY ACCOMPLISHMENTS

- Main issue was to overcome lignin solubility in media, hence UltraSonication is applied. Resulting extreme increase in carboxyl groups (above) and only slight increase in M<sub>w</sub> (from ~2400 to ~3000 g mol<sup>-1</sup>).
- Both strains were already shown to grow on EOL as a sole carbon source.
- UltraSonicated-lignin should give the opportunity to study product formation, it is water soluble at pH 7 enabling the separation off cells from feedstock

