CELLULOSE NANO WHISKERS REINFORCED POLYURETHANE FOAM

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PROGRAM DESCRIPTION

- Sulfuric acid hydrolyzed cellulose nano whiskers (CNWs) will be incorporated into polyurethane matrix for improved mechanical and thermal properties.
- Ethanol organosolv lignin will be oxypropylated with propylene oxide for preparation of a promising polyol in polyurethane (PU) industry.
- This project is aim to produce a novel rigid PU foam nanocomposite which is environmentally friendly and has better performance than the neat foam and foam reinforced with other inorganic fillers.

TECHNICAL DETAILS

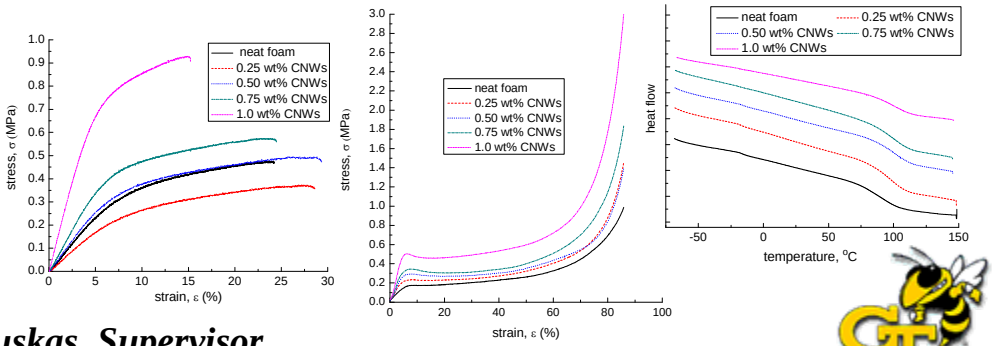
- CNW is prepared by sulfuric acid hydrolysis of fully bleached softwood kraft pulp.
- Lignin is extracted by ethanol organosolv of pine wood chips.
- Klason lignin and carbohydrates of EOL are measured.
- Structure of EOL and oxypropylated lignin are characterized by ^{1}H NMR and ^{13}C NMR
- Hydroxyl conent of oxypropylated lignin are evaluated by ^{31}P NMR.
- SEM is used to characterize the cell structure of foams
- FTIR is performed to investigate the CNW-PU interactions.
- Tensile and compressive properties are compared.
- DSC and TGA are used to exam the thermal stability.

PAYOFF

- New green polymeric foam
- Large amount of biodegradable and renewable CNW can be used to prepare tremendous new materials.
- Lignin can get extra value in PU industry instead of using by simply burning black liquors.
- Biodegradability and high performance can be introduced to rigid PU foam for more applications.

KEY ACCOMPLISHMENTS

- CNW reinforced rigid PU foam are successfully prepared with a homogeneous cell dispersion and uniform cell size.
- Improved tensile and compressive properties and thermal stability are observed at low CNWs content (≤1 wt%).



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