Pre-Proposal Title: Engineering Pulp Fines into a Superabsorbent Hydrogel

GT Project Staff:

Principal Investigator: Art Ragauskas

PROJECT OBJECTIVE:

The goal of the proposed work is to optimize the crosslinking of SW ECF bleached kraft refiner dust and pulp fines to form a cross-linked hydrogel with enhanced water retention properties. Currently, an ongoing IPST@GT Exploratory Project has conclusively demonstrated that (1) the crosslinking of SW fibers results in an 82-185% increase in water absorption and (ii) the enhanced water absorption is dependent on fiber size. This networked hydrogel has the potential of utilizing pulp fines for use in large volume super-absorbent applications (SAP), such as absorbents for meat packaging, agricultural packaging, tissue, towel, and hygiene products. The cross-linking of cellulosics provides a unique superabsorbent gel that addresses the industry' need to make new, high value products from pulp fibers, as described in the IPST@GT strategic research vision, and by Agenda 2020.

PROJECT BACKGROUND:

Recent studies in our laboratory have focused on creating cellulosic based superabsorbents. Building on recent IPST@GT IP we have examined the use of cross-linking cellulosics with polyvinylmethylether/maleic anhydride copolymer (PVMEMA) and polyethylene glycol (PEG) to generate new value-added superabsorbent materials. As summarized in Figure 1, the cross-linking of SW kraft fibers with pulp fibers was shown to significantly increase the water absorption properties of the treated material. Furthermore, we have shown that the enhanced water absorbency properties are dependent on the size of the SW kraft fibers.

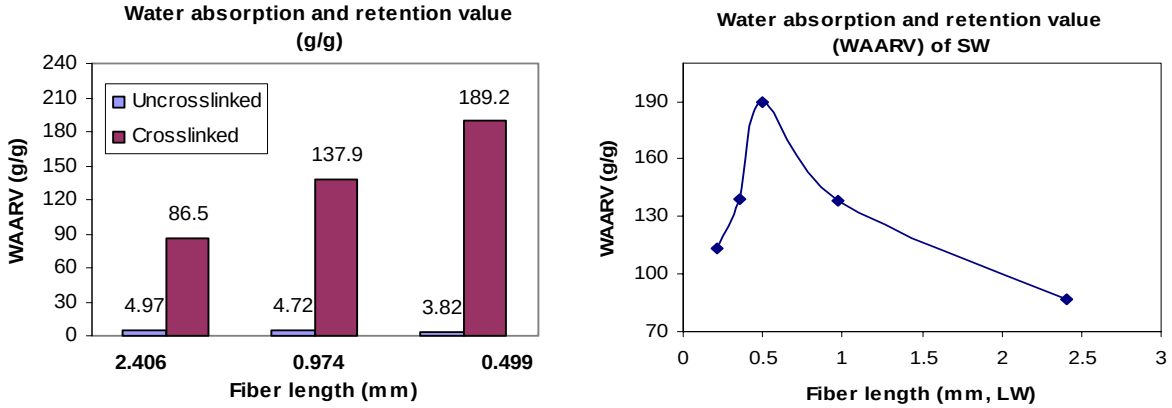

Figure 1: Water absorbency value of crosslinked ECF softwood kraft pulp. Water absorbency determined by water retained after centrifuging.

DELIVERABLES and VALUE:

This project will optimize the performance of crosslinked SW ECF fines for the production of cellulosic superabsorbents. A key goal for this project is the minimization of the charge of crosslinking reagents employed and the cure temperature (i.e., currently ~130 ^{o}C). Near the completion of FY 2008-09, the PI will utilize this data to provide our sponsors a competitive analysis against commercial SAPs. These results will be utilized to identify product platform applications in the tissue/towel and SAP market which is currently growing by 6% annually. In

turn, we will use these results to develop a technology transfer program to allow our sponsors to utilize these new cellulosic superabsorbents in their product platforms.

PROJECT GOALS:

Project goals include (i) minimization of crosslinking reagents and cure temperature and (ii) optimization of % SW fiber fines for superabsorbent production. Evaluate physical properties of crosslinked fibers, including: thermal and brightness stability.