

Using Soy Proteins to Reduce Costs of Dewatering of Fibrous Sludge (#6128)

A greener alternative to traditional polymeric flocculant sludge conditioners at a fraction of the cost

This technology provides a significantly more cost-effective method for dewatering fibrous sludge discarded from paper mills. By using soy proteins supplemented with a small amount of cationic polyacrylamide (CPAM), a polymeric flocculant, researchers at Georgia Tech have dewatered fibrous sludge and produced higher cake solids than when using 100% CPAM—and have done it at a much lower cost.

The process requires isolation of the soy protein from soy flour. By suspending the soy in alkali and then adding it directly to the sludge, the process separates the protein from the flour *in situ*. The CPAM, used to maintain filtrate clarity, is added afterward to avoid exposure to the alkali.

This combination results in an increase in cake solids during belt pressing of fiber or fibrous sludge. A slightly higher CPAM supplement can combat the higher filtrate total suspended solids (TSS) that may be experienced, reducing the cost savings accordingly.

The cost of the soy-CPAM combination is one-fifth that of CPAM used alone. Not only is the soy cheaper than the CPAM, but it also has less environmental impact than using 100% CPAM. In addition, the cost of soy is much more stable than the cost of CPAM, which fluctuates with the price of oil from which it is produced.

Benefits/Advantages

- **Cost-effective:** Decreases costs by 80% compared to using 100% CPAM
- **Greater price stability:** Experiences much less price fluctuation than the hydrocarbon feedstock from which CPAM is manufactured
- **More environmentally friendly:** Reduces the mass and volume of sludge requiring disposal and is a nonpetroleum-based option

Potential Commercial Applications

- Paper production
- Mineral processing industries
- Other industrial processes

Background/Context for This Invention

Sludge is typically conditioned with a polymer such as a CPAM prior to dewatering and disposal. CPAMs are manufactured from a hydrocarbon feedstock and their cost fluctuates with the price of oil. Soy derivatives have been used in place of hydrocarbon-based products in several applications. Georgia Tech's new process replaces up to 90% of the traditionally used petroleum-based CPAM with soy protein and was tested on paper mill sludge and bleached hardwood fiber.

Dr. Sujit Banerjee

Emeritus Professor - Georgia Tech School of Chemical and Biomolecular Engineering

More Information

U.S. Patent Issued - [9,644,318](#)

International Application Filed - [WO2014014790A3](#)

Publications

[*Dewatering Fibrous Sludge with Soy Products*](#), Paper 360° TAPPI.org, May/June 2015

[*Dewatering Fibrous Sludge with Soy Products*](#), Process Biochemistry, January 2014

For more information about this technology, please visit:

<https://licensing.research.gatech.edu/technology/using-soy-proteins-reduce-costs-dewatering-fibrous-sludge>

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot

