

Improved isolation and utilization of zein

A. What is this technology?

- An improved method to remove zein from corn gluten meal has been developed through the use of acetic acid as the extracting solvent.
- Zein fibers have been produced using electrospinning techniques.
- Solvent-resistant zein articles have been produced.

B. What problem does it address?

Corn gluten meal is one of the main co-products of the ethanol industry utilizing wet milling techniques. Distillers dried grains is one of the main co-products of the ethanol industry utilizing dry milling techniques. Zein is a major component in both of these co-products.

- Improved utilization of the co-products of the bio-ethanol industry will improve the economics of this industry.
- Improved isolation and utilization processes will benefit this industry.

C. What is the significance of this solution?

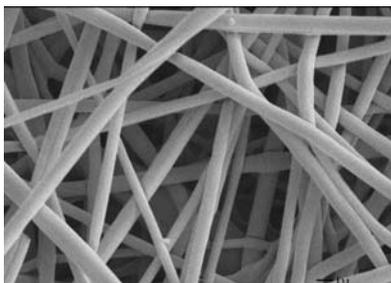
Improved extraction of zein from the co-products of the ethanol industry will allow the production of zein at a lower cost. This would result in the ability of zein to enter more markets which are currently being serviced predominantly by petroleum based products.

D. Who could use this technology?

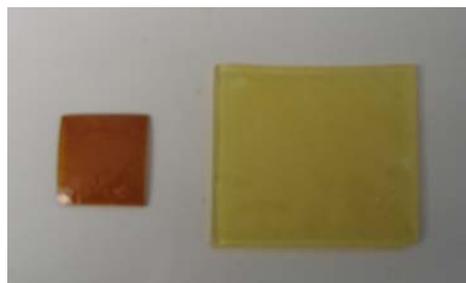
- Dry or wet mill bio-ethanol producers
- Polymer/plastic producers and converters

E. How is this technology unique?

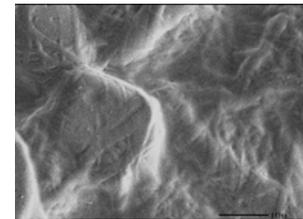
- Extraction of zein from corn gluten meal is typically performed commercially using alcohol/water systems. The use of acetic acid can deliver up to 12x the amount of zein when performed under similar extraction conditions.
 - Extraction of zein from corn gluten meal with 100% ethanol has been improved by heating the mixture above the boiling point of ethanol.
- Round zein fibers have not been produced through the use of electrospinning. Through the use of acetic acid as solvent, micron sized fibers can be obtained with good continuity.
- Glyoxal has been shown to cross-link zein both in solution and through melt processes. This will allow producers the ability to use the most economical (extrusion) techniques available in processing zein.



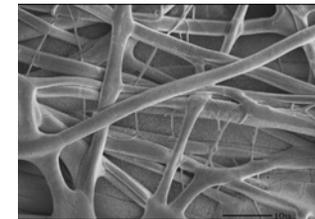
Zein electrospun from acetic acid solution – 2000x, 0.4 – 1.6 µm.



Zein-Glyoxal Film – Before & After Soaking in Dimethylformamide (control films would dissolve)



Zein electrospun fiber after water application



Modified zein electrospun fiber after water application



Control Sample Control samples after boiling water Modified zein sample after boiling water

Stage of Development

- Manuscripts describing these technologies have been prepared.
- One patent application has been filed.

Moving Forward

- A partnership with either a wet or dry mill ethanol producer would be beneficial in determining the ability to isolate zein using either the acetic acid or 100% ethanol approach.
- We are also seeking partnership with a company able to assist in developing melt processes using modified zein.



Researchers

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