Zein is a protein abundant in corn gluten meal and corn gluten feed, byproducts of corn milling. This generally recognized as safe (GRAS) protein is hydrophobic and has already been shown to successfully encapsulate and improve the stability and bioaccessibility of hydrophobic bioactive compounds. However, zein nanoparticles (ZNP) suspended in water are inherently unstable and aggregate within one week. They are especially unstable at its isoelectric point of pH 6.2 or in high ionic strength solutions. Carrageenan is an anionic polysaccharide that can potentially electrosterically stabilize ZNP by interacting with the outer layer. The objective of this experiment is to improve the physical stability of zein using iota carrageenan (iCGN) adding value to a byproduct of corn milling.

**MATERIALS AND METHODS**

**Materials**
- Zein supplied by Sigma Aldrich
- i-Carrageenan supplied by FMC biopolymer

**Synthesize Nanoparticles**
Rinse 2.5% Zein solution (dissolved in 80% ethanol) with water under high shear  Evaporate Ethanol with rotary evaporation  Centrifuge at 4000 RPM for 10 min

**Complex with Carrageenan**
- Add 0.1 mL 0.1% Zein with carrageenan to make 6 different ratios diluted with 10mM sodium phosphate buffer set at 7 pH levels
- pH Levels: 7.0, 6.75, 6.5, 6.25, 6.0, 5.75, 5.5, 5.25, 5.0
- Zein/i-Carrageenan Ratios: 1:0, 10:1, 5:1, 2:1, 1:1, 1:2

**Characterize**
- Atomic Force Microscopy
- Dynamic Light Scattering
- Turbidity
- Zeta Potential

**RESULTS**

**Atomic Force Microscopy**
- 1:0 Zein:Carrageenan pH 5
- 1:1 Zein:Carrageenan pH 6
- 2:1 Zein:Carrageenan pH 6

**Dynamic Light Scattering**
- Zein +iCGN had smaller particle sizes that were stable for at least 30 days
- Weaker binding at pH 7

**Zeta Potential**
- Zein +iCGN had lower z-potential
- Increasing iCGN concentration lowered z-potential

**Turbidity**
- Zein +iCGN had lower turbidity at low pH

**REFERENCES**