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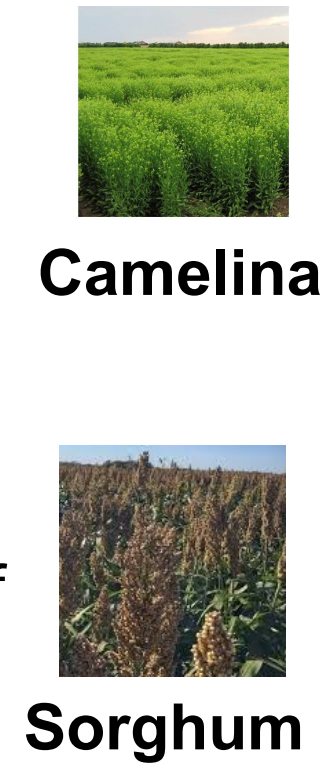
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## PROBLEM & PROPOSED SOLUTION

UNL currently has a strong research program on improvement of biomass feedstock sorghum and camelina to improve agronomic properties of these energy crops.



ISSUES

Current approaches use only limited fractions of sorghum and camelina to produce biofuel, and remaining parts are treated as waste.

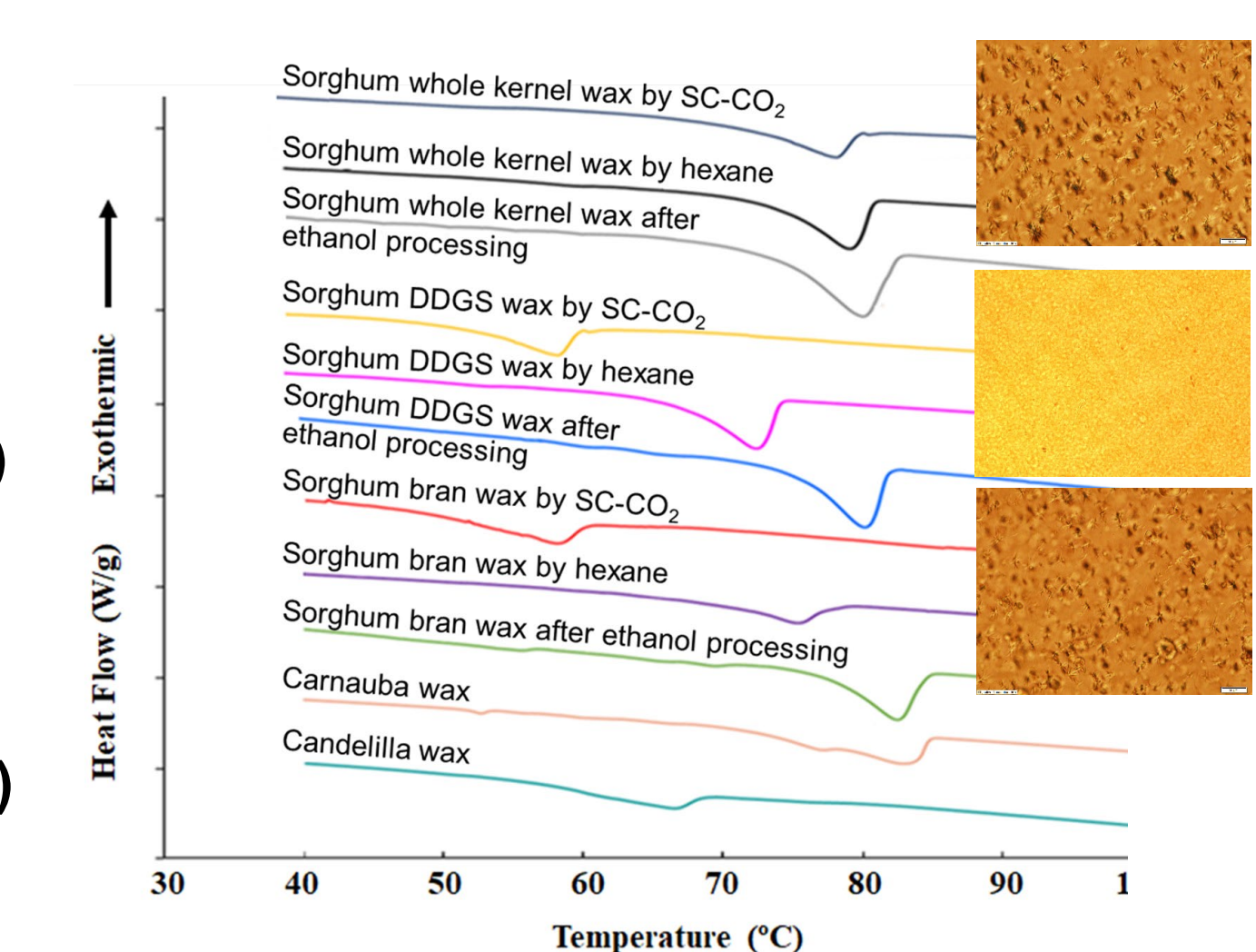
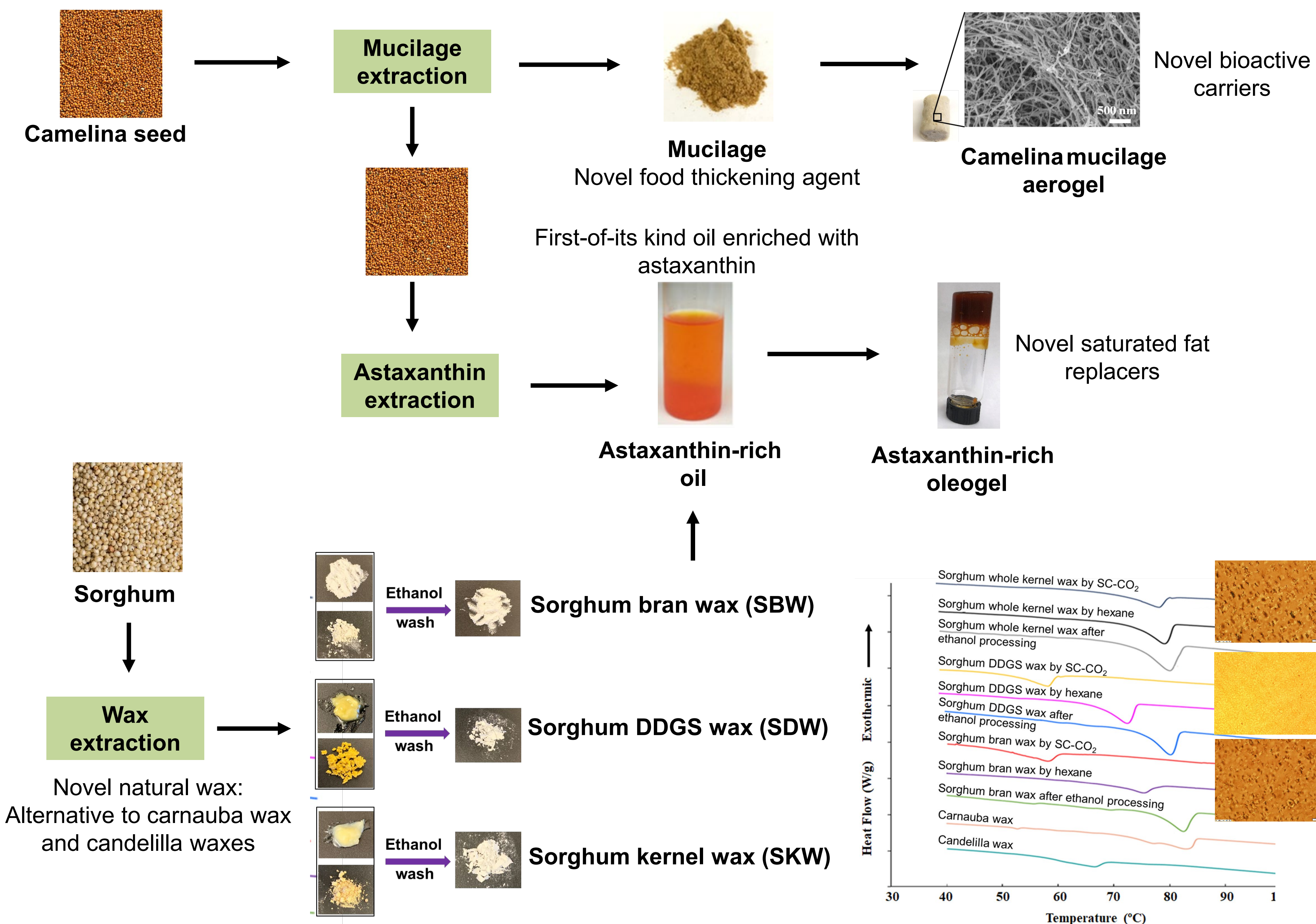
### Innovative interdisciplinary approaches

- To develop an innovative integrated approach to utilize wastes obtained from the processing of camelina and sorghum for biofuel production.
- To produce several high value-added fractions and products to be used as novel food ingredients.

## GOAL AND OBJECTIVES

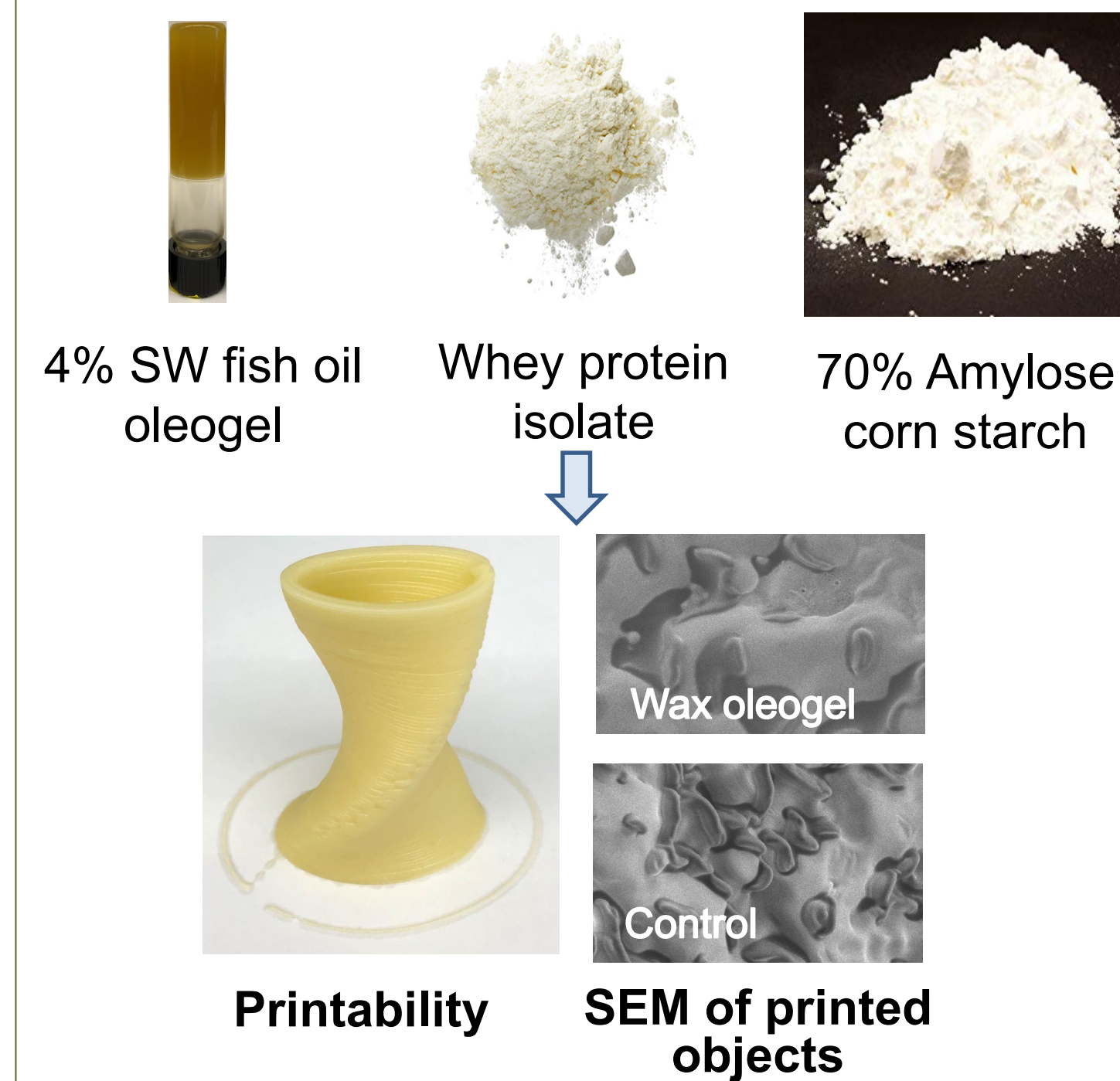
- Goal:** To develop novel high value products and fractions from camelina and sorghum.
- Objectives:**
- To extract camelina mucilage, prepare camelina mucilage aerogel and evaluate the printability of printing paste with mucilage.
  - To extract and purify sorghum wax and evaluate the printability of wax-oleogel pastes.
  - Develop an innovative approaches for complete utilization camelina and sorghum co-products

## DEVELOPMENT OF NOVEL FOOD INGREDIENTS

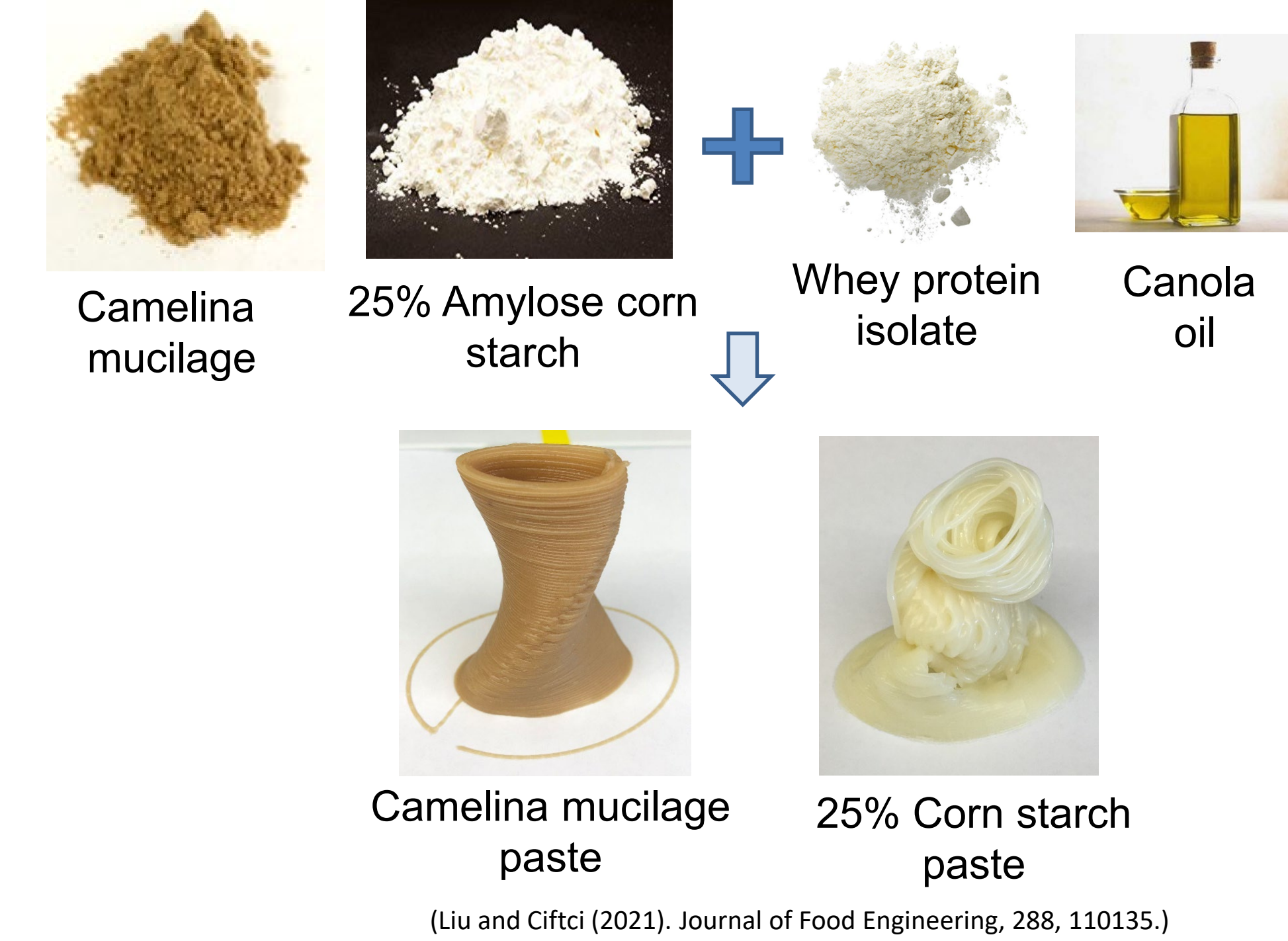


## APPLICATIONS

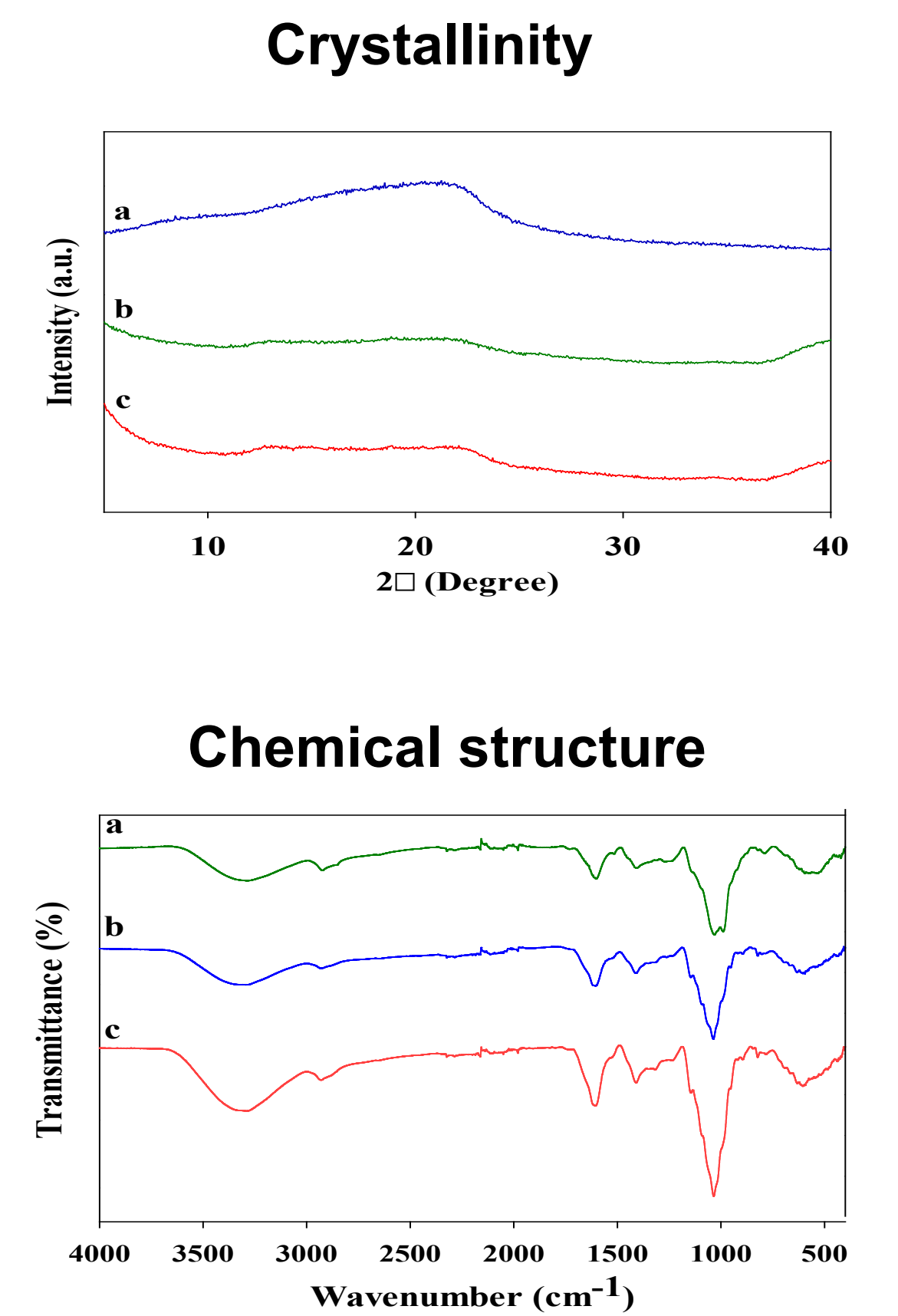
### 3D food printing using sorghum wax oleogel



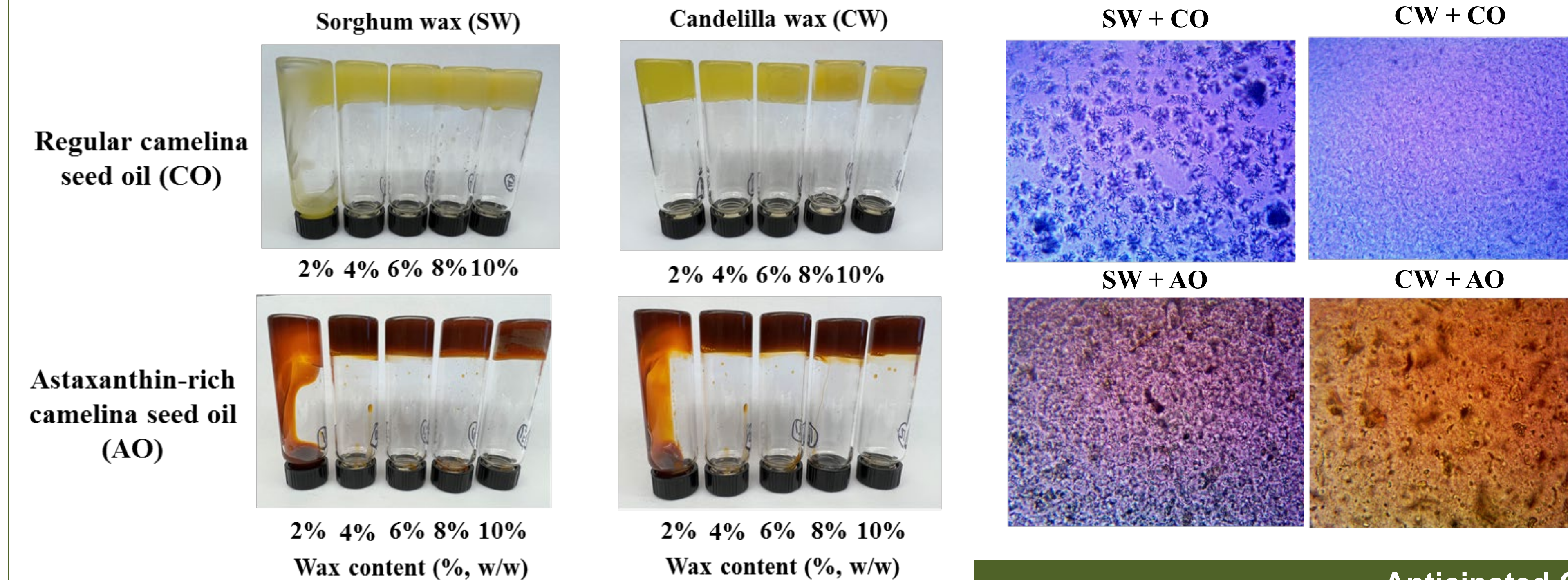
### Camelina mucilage allows 3D printing of high-liquid oil pastes



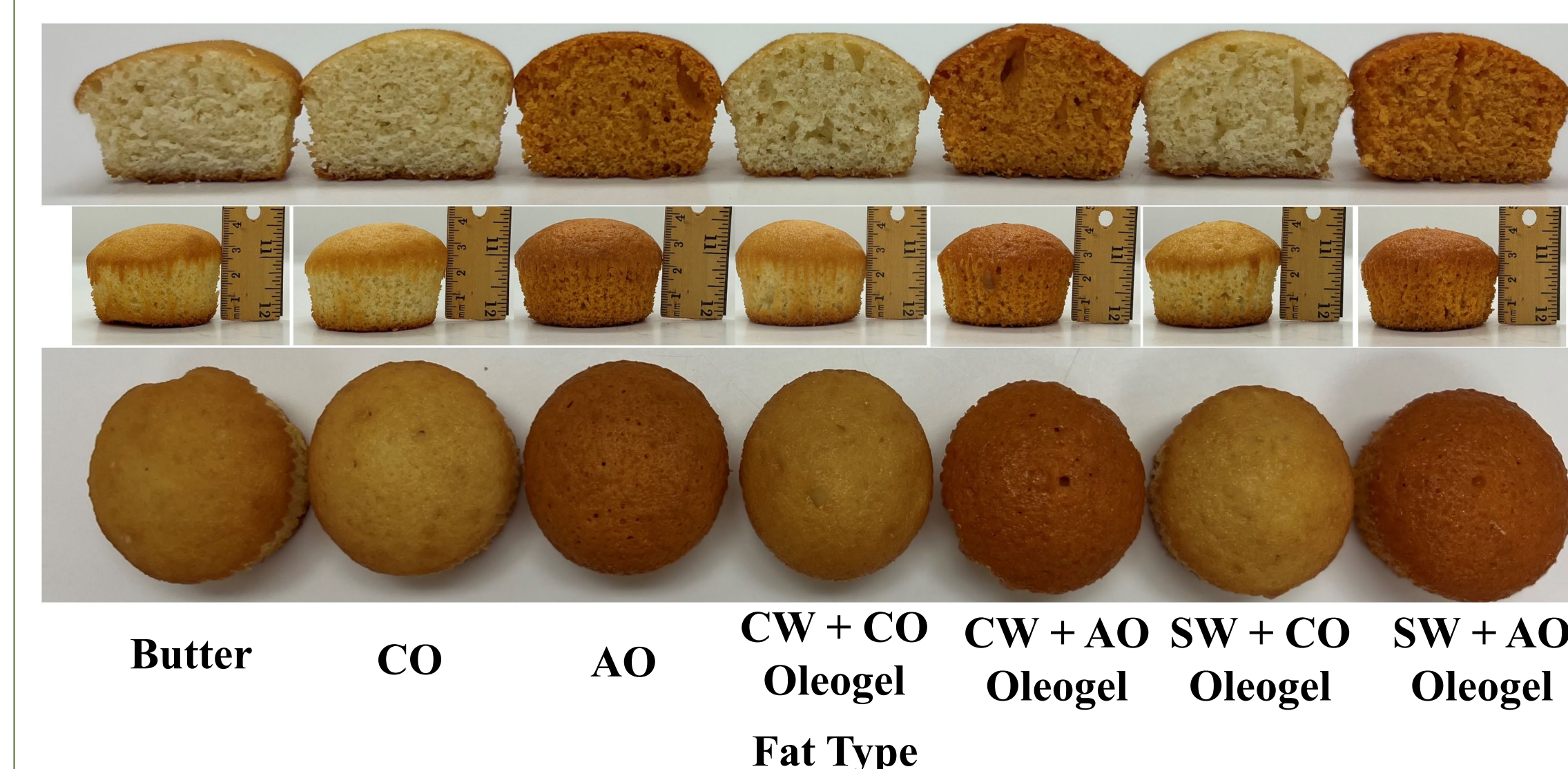
### Characterization of camelina mucilage aerogel



### Astaxanthin-rich camelina seed oil oleogel with natural wax



### Astaxanthin-rich camelina seed oil oleogel as a saturated fat replacer



### Anticipated Outcome & Impact

- Camelina astaxanthin-rich oil is a novel bioactive-rich oil that improves oxidative stability of omega-3 camelina seed oil.
- Camelina mucilage is a novel food ingredient alternative to xanthan gum.
- Sorghum wax is a novel natural food grade wax alternative to carnauba wax and candelilla wax that has the potential to minimize dependency of US for imported natural waxes.
- Camelina mucilage is a new ingredient for 3D food printing overcoming a critical challenge associated with 3D printing high-oil-content food pastes.
- Astaxanthin-rich camelina seed oil is a novel oil that can be used to generate "healthier" saturated fat replacers.
- Several novel and high value products from sorghum and camelina that will enhance the sustainability and economic value of these crops as energy crops.
- Stimulate job creation and additional market opportunities for Nebraska farmers.

### Acknowledgments

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