Use this page to provide an abstract (up to 350 words) outlining the research described in your poster. **This OUTLINE MUST BE APPROVED AND SIGNED BY THE DEPARTMENT HEAD OR MAJOR PROFESSOR.** (Note: *email notification by your advisor to Ms. Debbie Koch can be substituted for the signature)*

Banana is the most globally consumed fruit crop. However, half of the world's annual production of banana is being wasted without consumption. Banana loss is primarily caused by undesired ripening during distribution. During distribution, bananas are easily affected by ethylene (a plant hormone that regulates ripening) and begin to ripen. Ripening can be prevented or delayed by lowering ethylene concentration within banana containers using nano-adsorbent. Metal Organic Framework (MOF), a nano-adsorbent that can adsorb small gaseous molecules, has the potential to be embedded in food package to prevent or delay ripening during distribution. The objective is to develop functional packages by embedding MOF to regulate ethylene to extend banana shelf life.

The concept of developing MOF embedded package was evaluated. Ethylene adsorption and desorption by eight commercial MOFs were evaluated by using Gas Chromatography (GC) to measure headspace ethylene, the best candidate was then chosen to be embedded in packaging films by extrusion, and parameters including polymers grade and MgF loading were optimized to improve film integrity. Extruded MgF embedded LDPE films were then made into packages for bio-efficacy studies under three different conditions, simulating different banana shipping and handling scenarios, color and sugar spot scales were used to evaluate banana ripening stage.

First, magnesium formate MOF (MgF) was identified as the best candidate as ethylene adsorbent, which has the highest capacity to adsorb and retain ethylene. This capacity increases with temperature; it was increased by 62% after exposure at 300-350°C for 5 min. Second, MgF embedded in LDPE film was found to be more effective than poly vinyl alcohol (PVA) and polylactic acid (PLA) films to scavenge ethylene. After optimization, two types of film, 2% MgF embedded in 100% Epolene® polymer (EP) and in 50%/50% blend of EP and Marlex® 4517 polymer (MP), were successfully produced for bio-efficacy study. Results show that MgF films can delay banana ripening for 5 days. They also delayed the color development of banana after ripening, and maintained the color within the color stage for consumer purchase preference. In conclusion, it is feasible to embed MOF in food package to regulate ethylene to extend banana shelf life.

The above, proposed plan of research is approved and accepted.

DATE SIGNATURE OF DEPARTMENT HEAD OR MAJOR PROFESSOR - PRINT NAME