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Hazal Turasan, Purdue University

Creating biodegradable corn protein-based electrospun nanofiber platforms for SERS detections

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Extensive usage of petroleum-based polymers in food packaging, clothing, electronic device engineering and agriculture applications has led the scientific community to focus on replacing those with environmentally friendly 'green' polymers. Zein, the most abundant corn protein, is a waste product of ethanol production and is a good candidate for 'green' polymers due to its wide availability, film forming capability, low toxicity, and high compatibility in blends. The objective of our study is to fabricate a biodegradable zein-based platform that can be used in the detection of food allergens and toxins using SERS. Due to their very high surface area to volume ratio, the biodegradable platform is created from electrospun zein nanofibers which can accommodate a high concentration of metallic nanoparticles that can enhance the intensity of SERS signals. The effects of solvents and zein concentration on the quality and uniformity of the zein fibers were studied. The optimized formulation was tested in the nanoparticle decoration using two methods; in-solution and drop deposition. Chemical crosslinking was used to prevent swelling of nanofibers. To test the effectiveness of the decoration process, SERS measurements will be conducted with Rhodamine 6G using high enough nanoparticle concentrations to create significant proximity between the nanoparticles.