

## **Development and characterization of the biodegradable film derived from eggshell and cornstarch**

### **ABSTRACT**

In the current study, cornstarch (CS) and eggshell powder (ESP) were combined using a casting technique to develop a biodegradable film that was further morphologically and physicochemically characterized using standard methods. Scanning electron microscopy (SEM) and transmission electron microscopy (TEM) were used to characterize the morphology of the ESP/CS film, and the surface of the film was found to have a smooth structure with no cracks, a spherical and porous irregular shape, and visible phase separation, which explains their large surface area. In addition, the energy dispersive X-ray (EDX) analysis indicated that the ESP particles were made of calcium carbonate and the ESP contained carbon in the graphite form. Fourier Transform Infrared Spectroscopy indicated the presence of carbonated minerals in the ESP/CS film which shows that ESP/CS film might serve as a promising adsorbent. Due to the inductive effect of the O–C–O bond on calcium carbonate in the eggshell, it was discovered that the ESP/CS film significantly improves physical properties, moisture content, swelling power, water solubility, and water absorption compared to the control CS film. The enhancement of the physicochemical properties of the ESP/CS film was principally due to the intra and intermolecular interactions between ESP and CS molecules. As a result, this film can potentially be used as a synergistic adsorbent for various target analytes.