A biodegradable hydrogel extracted from okara: potential in application as wearable sensor

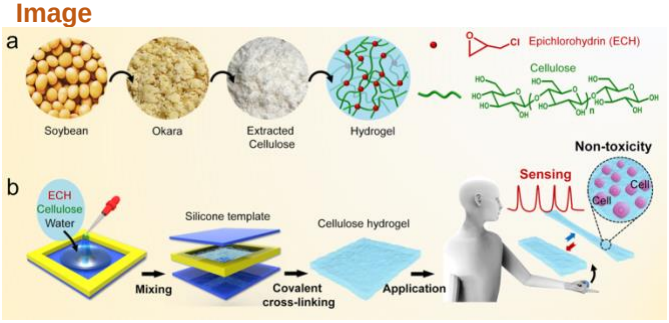
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Abstract (300 word limit)

A biodegradable and non-toxicity hydrogel derived from the extracted okara cellulose and its potential application as wearable sensor were evaluated. Physical properties, biodegradability, and cytotoxicity were determined to characterize the okara cellulose and okara cellulose hydrogels. Fourier-transform infrared spectroscopy shows the extracted cellulose is pure without protein, lipids, hemicellulose, and lignin. Porous structure can be found on the fracture surface of okara cellulose hydrogels from scanning electron microscope. The tensile strain at fracture of the okara cellulose hydrogel can reach to 98.2% in the case of 0.7 molar ratio of epichlorohydrin (ECH) to anhydroglucose units (AGU). No hydrogel residue can be found after burying in the soil for 28 days, indicating its good biodegradability. Three different dilutions of hydrogel extract expressed no cytotoxicity on NIH3T3 cells according to MTT assay. Application test shows that the resistance change ratio of okara cellulose hydrogel can be 20% when the finger and wrist bending to 90 degree as a wearable sensor, which implies the feasibility of new material made from okara. This research discloses its enlightenment to the comprehensive utilization of food by-products.

Image



Recent Publications (minimum 5)

1. **Cui, X.**, Lee, J. J., & Chen, W. N. (2019). Eco-friendly and biodegradable cellulose hydrogels produced from low cost okara: towards non-toxic flexible electronics. Scientific Reports, 9(1), 1-9.
2. Zhao G, Lee J, **Cui X**, Chen W* (2019) Biodegradable and transparent cellulose film prepared eco-friendly from durian rinds for packaging application. Food Packaging and Shelf Life, 21, 100345.
3. **Cui, X.**, Huang, Y., Wang, J., Zhang, L., Rong, Y., Lai, W., & Chen, T. (2015). A remarkable sensitivity enhancement in a gold nanoparticle-based lateral flow immunoassay for the detection of Escherichia coli O157: H7. Rsc Advances, 5(56), 45092-45097.
4. **Xi, C. U. I.**, XIONG, Q. R., XIONG, Y. H., Shan, S. H. A. N., & Wei-Hua, L. A. I. (2013). Establishing of a method combined immunomagnetic separation with colloidal gold lateral flow assay and its application in rapid detection of Escherichia coli O157: H7. Chinese Journal of Analytical Chemistry, 41(12), 1812-1816.
5. Xiong, Q., **Cui, X**., Saini, J. K., Liu, D., Shan, S., Jin, Y., & Lai, W. (2014). Development of an immunomagnetic separation method for efficient enrichment of Escherichia coli O157: H7. Food control, 37, 41-45.
6. Xie, F., Lai, W., Saini, J., Shan, S., **Cui, X.**, & Liu, D. (2014). Rapid pretreatment and detection of trace aflatoxin B1 in traditional soybean sauce. Food chemistry, 150, 99-105.
7. Shan, S., Zhong, Z., Lai, W., Xiong, Y., **Cui, X.**, & Liu, D. (2014). Immunomagnetic nanobeads based on a streptavidin-biotin system for the highly efficient and specific separation of Listeria monocytogenes. Food Control, 45, 138-142.

Photograph



/Biography (150 word limit)

Xi Cui is a year four Ph.D. candidate from Nanyang Technological University, Singapore. She is studying in turning food waste into biodegradable materials. She has already published two research papers during her Ph.D. study.

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Notes/Comments: