

Surf and Earth: How prawn shopping bags could save the planet

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Chitosan film made from shrimp shell in the early developmental phase. Credit: University of Nottingham

Bioengineers at The University of Nottingham are trialling how to use shrimp shells to make biodegradable shopping bags as a 'green' alternative to oil-based plastics, and as a new food packaging material to extend product shelf life.

The new material for these affordable 'eco-friendly' bags is being optimised for Egyptian conditions, as effective waste management is one of the country's biggest challenges.

An expert in testing the properties of materials, Dr Nicola Everitt from the Faculty of Engineering at Nottingham, is leading the research together with academics at Nile University in Egypt.

"Non-degradable plastic packaging is causing environmental and public health problems in Egypt, including contamination of water supplies which particularly affects living conditions of the poor," explains Dr Everitt.

Natural biopolymer products made from plant materials are a 'green' alternative growing in popularity, but with competition for land with food crops, it is not a viable solution in Egypt.

This new project aims to turn shrimp shells, which are a part of the country's waste problem into part of the solution.

Dr Everitt said: "Use of a degradable biopolymer made of prawn shells for carrier bags would lead to lower carbon emissions and reduce food and packaging waste accumulating in the streets or at illegal dump sites. It could also make exports more acceptable to a foreign market within a 10-15-year time frame. All priorities at a national level in Egypt."



Chitosan film made from lab-grade chitosan. Credit: University of Nottingham

The research is being undertaken to produce an innovative biopolymer nanocomposite material which is degradable, affordable and suitable for shopping bags and food packaging.

Chitosan is a man-made polymer derived from the organic compound chitin, which is extracted from [shrimp shells](#), first using acid (to remove the calcium carbonate "backbone" of the crustacean shell) and then alkali (to produce the long molecular chains which make up the biopolymer).

The dried chitosan flakes can then be dissolved into solution and

polymer film made by conventional processing techniques.

Chitosan was chosen because it is a promising biodegradable polymer already used in pharmaceutical packaging due to its antimicrobial, antibacterial and biocompatible properties.

The second strand of the project is to develop an active polymer film that absorbs oxygen. This future generation food packaging could have the ability to enhance food shelf life with high efficiency and low energy consumption, making a positive impact on food wastage in many countries. If successful, Dr Everitt plans to approach UK packaging manufacturers with the product.

Additionally, the research aims to identify a production route by which these degradable biopolymer materials for shopping bags and [food packaging](#) could be manufactured.



Dr. Nicola Everitt in her laboratory working on the study. Credit: University of Nottingham

The project is sponsored by the Newton Fund and the Newton-Mosharafa Fund grant and is one of 13 Newton-funded collaborations for The University of Nottingham. The collaborations, which are designed to tackle community issues through science and innovation, with links formed with countries such as Brazil, Egypt, Philippines and Indonesia.

Since the Newton Fund was established in 2014, the University has been awarded a total of £4.5m in funding. It also boasts the highest number of institutional-led collaborations.

Professor Nick Miles Pro-Vice-Chancellor for Global Engagement said: "The University of Nottingham has a long and established record in global collaboration and research. The Newton Fund plays to these strengths and enables us to work with institutions around the world to solve some of the most pressing issues facing communities."

From a total of 68 universities, The University of Nottingham has emerged as the top awardee of British Council Newton Fund Institutional Links grants (13) and is joint top awardee from a total of 160 institutions competing for British Council Newton Fund Researcher Links Workshop awards (6).

Professor Miles added: "This is testament to the incredible research taking place across the University - both here in the UK and in the campuses in Malaysia and China - and underlines the strength of our research partnerships around the world."

Provided by University of Nottingham

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