

Advance could mean stain-busting super scrub brushes and other new laundry products

April 18 2012

Scientists are reporting development and successful testing of a way to reuse -- hundreds of times -- the expensive, dirt-busting enzymes that boost the cleaning power of laundry detergents and powdered bleaches that now disappear down the drain. The discovery, reported in the ACS journal *Industrial & Engineering Chemistry Research*, opens the door to new laundry products, like special scrub brushes or reusable enzyme-coated plastic flakes and strips that might be added to cheaper detergents and then saved for reuse.

C.S. Pundir and Nidhi Chauhan explain that the most effective laundry detergents on the market today contain enzymes, such as amylase, cellulase, protease and lipase. The enzymes break down starches, mud, proteins, and fats and oils in stains into smaller, more water-soluble pieces that are easily removed from garments. Enzymatic detergents (which make up over half the market) work well, but they are expensive compared with regular detergents. And although the enzymes are still active after a washing cycle, they get rinsed down the drain. In previous research, the scientists showed it was possible to attach individual enzymes to various surfaces in previous studies so they could be reused. Now, for the first time, the researchers bound all four enzymes onto a plastic surface.

They adhered all four enzymes to the inside surface of a plastic (PVC) bucket and to the PVC bristles of a scrub brush. Then they washed white

cotton cloths with starch, grass, egg or mustard oil stains in the bucket or with the brush. Less expensive, non-enzyme laundry detergents, used in the bucket or with the scrub brush, cleaned just as well or better than using the pricey enzymatic detergent by itself. The PVC-attached enzymes remained active when used as many as 200 times over three months. The new method "makes cheaper detergents better than expensive detergents for washing purposes," say the researchers.

More information: "Coimmobilization of Detergent Enzymes into a Plastic Bucket and Brush for Their Application in Cloth Washing" *Ind. Eng. Chem. Res.*, 2012, 51 (9), pp 3556–3563. [DOI: 10.1021/ie202053r](https://doi.org/10.1021/ie202053r)

Abstract

A mixture of detergent enzymes, α -amylase, cellulase, protease, and lipase has been coimmobilized covalently onto an inner wall of a plastic beaker and bristles of a plastic brush. The coimmobilized α -amylase, cellulase, protease, and lipase retained 66.7, 54.2, 44.64, and 62.8% on the beaker and 44.01, 66.23, 33.9, and 45.8% on the brush of their initial activity in free/native form. The conjugation yield of the enzymes/proteins onto beaker and brush was 0.02 mg/cm² and 0.016 mg/cm², respectively. The scanning electron micrographs (SEM) and Fourier transform infrared (FTIR) spectra of PVC sheet surfaces before and after coimmobilization of enzymes confirmed their coimmobilization. There were slight changes in optimal pH, incubation temperature and time for maximum activity and K_m of enzymes after immobilization. The combination of any nonenzymic (cheaper) detergent and immobilized enzymes gave equal/better washing of cotton cloths than that by enzymic detergent (costly) in distilled water. Similar results were obtained with other types of water.

Provided by American Chemical Society

Citation: Advance could mean stain-busting super scrub brushes and other new laundry products (2012, April 18) retrieved 8 May 2024 from <https://phys.org/news/2012-04-advance-stain-busting-super-laundry-products.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.