Longer-lasting fragrance is just a shampoo away, thanks to peptides

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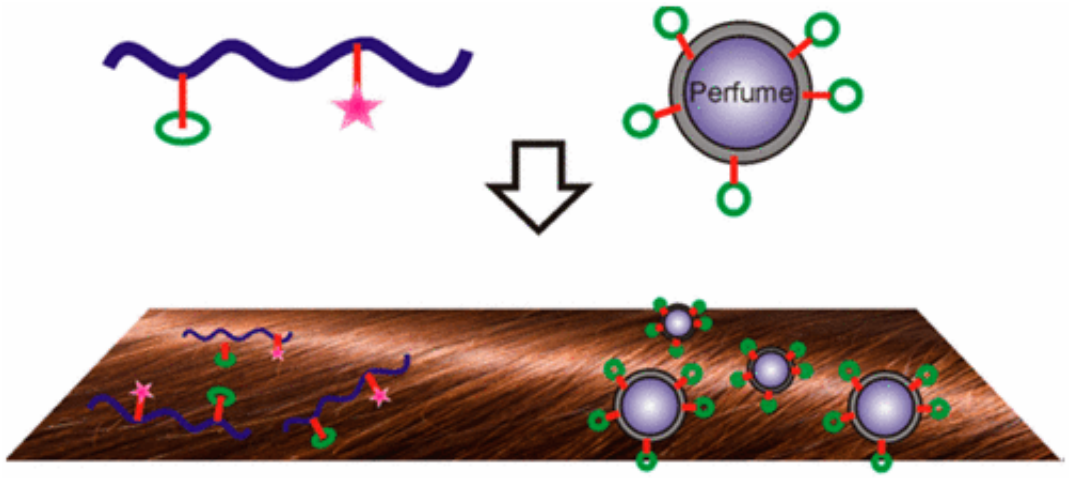

Credit: American Chemical Society

Many people select their shampoo based on smell. Unfortunately, that scent usually doesn't last long on hair. Now, one team reports in *ACS Applied Materials & Interfaces* a new way to help the fragrance "stick" to hair longer.

Fragrances are one of the most expensive shampoo ingredients, but most of these floral- or fruity-smelling compounds evaporate rapidly or are easily washed away when surfactants, such as shampoos, are used. Currently, manufacturers try to keep the smells around longer by incorporating delivery systems. One such system is "profragrances" in which a polymer is attached to the scent compound and is broken off

once shampooing starts, and another is encapsulation of the scent compound with polymers. Although these approaches have been shown to be effective, they still don't help fragrances adhere to the hair for long periods. Harm-Anton Klok, Andreas Herrmann and colleagues are now looking at ways to promote the deposition of scents onto hair.

The group identified a cyclic peptide that could bind to hair under shampooing conditions, which meant a low pH and in the presence of surfactants. Then, the peptide was connected to the two popular delivery systems: a microcapsule and a profragrance model polymer. They found that the peptide efficiently deposits both types of systems to hair. The researchers say that for the polymer and microcapsule tests, those that were bound to a peptide were loaded about 5 and 20 times more efficiently, respectively, onto hair than those that lacked a peptide. This increased deposition resulted in a stronger fragrance smell on hair for up to 24 hours after shampooing.

More information: Kemal Arda Günay et al. Selective Peptide-Mediated Enhanced Deposition of Polymer Fragrance Delivery Systems on Human Hair, *ACS Applied Materials & Interfaces* (2017). DOI: 10.1021/acsami.7b06569

Abstract
The deposition of fragrance delivery systems onto human hair from a shampoo formulation is a challenging task, as the primary function of shampoo is to cleanse the hair by removing primarily hydrophobic moieties. In this work, to tackle this challenge, phage-display-identified peptides that can bind to human hair under shampooing conditions are first identified and subsequently used to enhance the deposition of model fragrance delivery systems. These delivery systems are based on either poly(N-(2-hydroxypropyl)methacrylamide) (PHPMA) copolymers as a representative for polymeric profragrances or polyurethane/polyurea-type core–shell microcapsules as a model physical fragrance carrier. The

incorporation of a hair-binding peptide enhanced the deposition of PHPMA copolymers by a factor of 3.5–5.0 depending on the extent of peptide incorporation, whereas 10 wt % surface functionalization of microcapsules with the peptide led to a 20-fold increase in their deposition. In a final experiment, treatment of the hair samples under realistic application conditions with the peptide-functionalized microcapsules resulted in an increase in fragrance release from the hair surfaces.

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