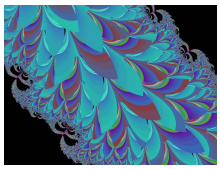
30 March 2007 By: Stefan Anitei, Science Editor



New Biodegradable Plastic Made of Feathers

A solution to plastic contamination

The problem of the plastic contamination could be solved by biodegradable polymers made of poultry feathers, a solution that would also decrease costs in poultry industry. Only in the US over 29 million tons of non-biodegradable plastic waste reach the landfills yearly. "12 % of all plastic packaging ends up in landfills because only a fraction is recycled," said Justin Barone, associate professor of biological systems engineering at Virginia Tech, who is investigating methods to create biodegradable plastics from agricultural byproducts, like poultry feathers and eggs that do not pass inspection, which could compete the petroleum-based plastics. "Once in the landfill, it doesn't biodegrade. The challenge is how can we create a simpler plastic bag or bottle that will biodegrade?"The technology of making biodegradable plastics from biomass, like corn and soybeans, has been developed for over 70 years. But the recent urge to maximize biofuel production from these feedstocks has boomed the value of these agricultural products, making them more expensive. Feathers and bad eggs are currently employed in low-value animal feed or are simply disposed, but their cost is paid by the consumers. "The challenge in developing biodegradable plastics is creating a product as good as, if not better than, its petroleum counterpart," explains Barone. "The industry is looking for a versatile product that can be used for multiple markets.""Plastics made from biomass are made just like petroleum-based plastics. They are cheaper to manufacture and meet or exceed most properties except for water resistance and longevity. Meeting these performance requirements is a challenge," explained Barone.Barone is focusing on the properties of polymers made of keratin, the protein that is the main component of the feathers. Keratin is also found in hair, nails, and horns and confers them hardness and strength. Barone has discovered that by changing the amino acid structure of keratin, the strength and longevity of the plastic polymers can be improved.The viscosity can be adjusted by employing reducing agents like sodium sulfite and lubricants like poultry fat. The solid-state traits can also be changed by employing divalent transition metal ions to influence stiffness and smell, in order to achieve keratin polymer that can be processed faster, are more aesthetic, water resistant and long-lived.