

Accelerators help keep baby dry

In the United States, we buy more than 20 billion disposable diapers each year. That's a lot of baby bottoms to keep dry, and parents everywhere can thank particle accelerators for doing their part.

About a decade ago, researchers at the Dow Chemical Company teamed up with Lawrence Berkeley National Laboratory to use the Advanced Light Source to develop materials for the optimal baby diaper.

When it comes to diapers, consumers look for a product that is as thin as possible but still holds a lot of moisture and doesn't leak. The answer: superabsorbent polymers.

No longer fluffy cotton, the active ingredient in today's diapers consists of superabsorbent polymer beads, long chains of interlinked molecules that can hold copious amounts of liquid. Each bead has a special layer on the outside that creates a seal after liquid gets absorbed so it won't leak back out.

Companies like Dow started manufacturing the polymer beads in the 'gos, but to make a leak-proof product, chemists needed to see the

microscopic details of the material. That's where the synchrotron light source at Berkeley came in.

"What really counts is how the material performs when it is wet, and you can't see that with a regular microscope," says Adam Hitchcock, a professor of chemistry at McMaster University and Canada Research Chair for Materials Analysis at the Canadian Light Source.

Using X-ray microscopy, a technique developed by Hitchcock and his collaborators, Dow chemists were able for the first time to see the detailed structure of the superabsorbent polymer material while wet. Dow brought a variety of samples to the ALS to analyze, and the X-ray microscopy technique enabled the chemists to adjust and improve the formula for the superabsorbent polymers until they had the perfect diaper.

"They were trying to find the magic recipe, and we were the feedback tool," Hitchcock said.

Dow used the results from the ALS research to design production processes at new superabsorbent polymer fabrication plants. All modern-day diapers now contain the superabsorbent polymer beads, keeping babies dry and parents happy.

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