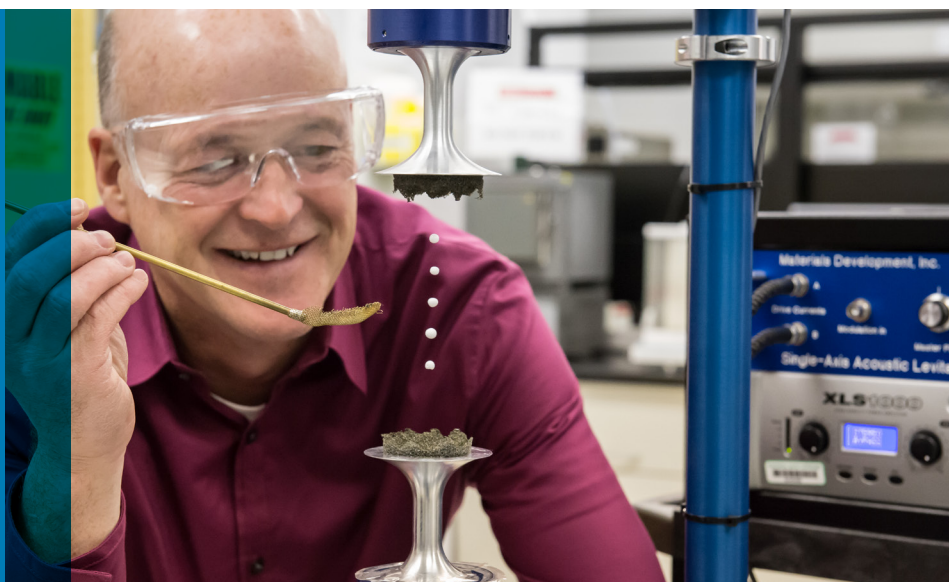


BETTER PHARMACEUTICALS MADE POSSIBLE WITH SOUNDWAVE LEVITATION



These drops of solution remain suspended for a long period of time, thanks to the pressure of sound waves that keep them stationary in an air column.

Argonne National Laboratory scientists using the U.S. Department of Energy Office of Science's Advanced Photon Source have devised a way to combine pharmaceutical compounds to increase solubility, lessen required dose amount, reduce side effects, and remove the need for refrigeration.

This overcomes a major hurdle for the pharmaceutical industry. The majority of pharmaceuticals have a crystalline structure, but this can limit their effectiveness because of low solubility in water. Changing the drug's molecular structure to an amorphous, or glassy, state can improve solubility, which allows the body to receive more of the disease-fighting chemicals. With more of the chemicals absorbed, pharmaceutical companies can use smaller quantities of chemicals, which in the case of some HIV treatments can alleviate side effects such as stomachaches. But current amorphizing techniques are applied to only about a dozen or so drugs on the market.

Scientists at Argonne used sound waves to expand this pool of drugs and provided valuable insight into

which conditions make for the best amorphous preparations. During the typical process of making drug compounds, crystals form when the evaporating liquid touches a surface. To avoid that, scientists evaporated the liquid in a containerless process by floating the chemical compounds on 22-kilohertz sound waves generated by an acoustic levitator. This also allows scientists to study the amorphizing process by x-raying the chemicals during processing.

IMPACT

This innovation gives the pharmaceutical industry another tool for designing drugs. It also could increase the ability to deliver drugs to remote areas in the developing world that lack refrigeration. While the technique only works on small

quantities of some drugs, scientists are continuing to test the technique on a wider range of drugs. Argonne patented the method.

PARTNERS

After adapting the technology for drug research, the Argonne scientists teamed with Purdue University and Arizona State University researchers to identify which drugs the levitation instrumentation will impact most strongly. Argonne's Technology Development & Commercialization Division is also interested in partnering with the pharmaceutical industry to develop the technology further, as well as to license it for commercial development.

FUNDING

The U.S. Department of Energy Office of Science provided funding for this work and for the APS.

MORE INFO

<http://www.anl.gov/articles/no-magic-show-real-world-levitation-inspire-better-pharmaceuticals>

Video: <https://www.youtube.com/watch?v=669AcEBpdsY>

TIMELINE

The foundational technology was created by NASA in the 1970s. This technology was adapted by Argonne between 2008 and 2012 for use with pharmaceuticals. Argonne patented this new technology in 2012.

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