

Synthesizing Pharmaceuticals Using Containerless Processing (IN-10-011)

A technique for creating faster-dissolving medicines

The Invention

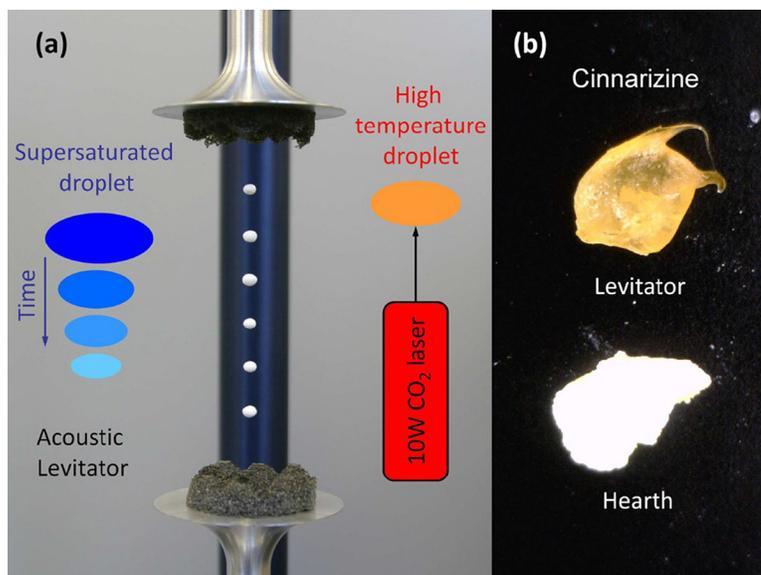
A process by which amorphous and nanophase pharmaceutical compounds can be synthesized without the use of a container, thus avoiding potential contamination. The process involves acoustic levitation—that is, a technique in which an object is suspended through pressure created by intense sound waves—to form molecular gels and amorphous solids. The method is expected to help pharmaceutical manufacturers create drugs that dissolve more quickly on delivery.

The containerless method involves the use of a levitator, a chamber in which objects can be suspended through sound-wave pressure. Argonne scientists developed two protocols using this technique on several over-the-counter and prescription medicines. In the first method, the team dissolved such drugs as ibuprofen and the antibiotic clofexol in ethanol, and then allowed droplets of the solution to evaporate while suspended in the levitator. In the second method, researchers used a laser to melt the antihistamine cinnarizine into droplets and suspend them as they cooled. Reference: C.J. Benmore and J.K.R. Weber, "Amorphization of Molecular Liquids of Pharmaceutical Drugs by Acoustic Levitation," *Phys. Rev. X* 1, 011004 (2011), <http://prx.aps.org/abstract/PRX/v1/i1/e011004>.

Benefits

A containerless process:

- ▶ Precludes the possibility of a drug's interaction with its container;
- ▶ Provides a more effective means of synthesizing amorphous pharmaceutical compounds;
- ▶ Offers higher yields than current state-of-the-art methods;
- ▶ Reduces potential for contamination during synthesis; and
- ▶ Is expected to advance the development of amorphous drug forms, increasingly important due to the emergence of new drugs that are virtually insoluble in crystalline form.



(a) Acoustic levitator simultaneously levitates several samples (shown as white spheres). Illustrations on either side of the levitator show two methods used in this study to create amorphous forms of pharmaceutical drugs. (b) Melted in the levitator, pure cinnarizine forms a yellow amorphous product; in the laser hearth, it forms a white crystalline product.

Applications and Industries

- ▶ Pharmaceutical industry

Developmental Stage

Proof of principle

Availability

Available for licensing

Patent Information

US Patent Application US2012/0197005 A1

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