

Scientists look through glass to find secrets that are less clear

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A new understanding of how glass is formed may assist with our understanding of everything from the design of golf club heads to the structure of the early universe.

Princeton chemists have found that the formation of glass -- a familiar substance that nonetheless retains some elusive scientific mysteries -- always occurs differently depending on how quickly a liquid substance is cooled into its solid form.

Though the findings will likely dash the hopes of condensed matter physicists who have long sought in vain for what is known as an "ideal" glass transition, they may also one day contribute to industrialists' efforts to create better plastics and other useful polymers.

"Glasses can be formed from any substance, and the way their molecules interact places them somewhere at the border between solids and liquids, giving them some properties that manufacturers can exploit," said Sal Torquato, a professor of chemistry who is also affiliated with the Princeton Center for Theoretical Physics. "Golf club heads made of metallic glasses, for example, can make golf balls fly farther. While our research could be utilized by industry, it can actually help us understand any 'glassy' multi-particle system, such as the early universe -- which cosmologists have described as a glass."

Torquato emphasized that it would probably be years before such practical applications become a reality, and that the findings were most

significant for advancing our fundamental understanding of how the state of matter known as glasses behaves.

Citation: Do Binary Hard Disks Exhibit an Ideal Glass Transition?
Torquato *et al.*, *Phys. Rev. Lett.*, 84, 2064 (2000).

Source: Princeton University

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