New insights into the formation of bulk metallic glasses

April 1 2021

Credit: Unsplash/CC0 Public Domain

With the ability to produce metallic glass in bulk quantities, the distinct mechanical behavior of these materials has opened up new application opportunities. However, the poor room temperature plasticity of bulk

metallic glasses (BMGs) impedes many engineering applications. Because of that, it's critical to better understand their plastic deformation and flow mechanism.

A team of researchers led by the lab of Udo Schwarz, department chair and professor of mechanical engineering and materials science, and chemical and environmental engineering, explored this issue. With the smallest-scale mechanical deformation testing to date on bulk metallic glasses, the results provide insights critical to understanding the plastic deformation mechanism of BMGs at the atomic scale. One notable finding is a yield stress slightly above theoretical maximum and much higher than what has previously been measured. Another is the finding of homogeneous plastic flow, which is not what's happening in crystals, and which is also not happening on metallic glasses on larger length scales. Additionally, glasses are found to be more homogeneous than previously thought.

The results were recently published in *Communications Materials*.

More information: Jiaxin Yu et al. Atomic-scale homogeneous plastic flow beyond near-theoretical yield stress in a metallic glass, *Communications Materials* (2021). DOI: 10.1038/s43246-021-00124-3

Atomic-scale homogeneous plastic flow beyond near-theoretical yield stress in a metallic glass. devicematerialscommunity.natur … -in-a-metallic-glass

Provided by Yale University