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## Improving the Fracture Toughness of Oxide Glasses through Bond Switching

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The low fracture toughness and practical strength of oxide glasses continue to be their Achilles heel, limiting both future applications and the possibility to make thinner, more environmentally-friendly glasses. In this work, we show that through control of a bond switching mechanism, record-high values of fracture toughness for transparent bulk oxide glasses can be achieved. Specifically, this is achieved by gas-mediated permanent densification of a structurally adaptive lithium aluminoborate glass. The fracture toughness of this densified bulk glass (1.4 MPa m<sup>0.5</sup>) is twice as high as that of standard window glass (0.7 MPa m<sup>0.5</sup>). Classical molecular dynamics simulations reveal that the permanent densification enables more coordination number changes and bond swapping during deformation, ultimately enhancing the degree of plasticity and toughness upon fracture.

Reference: To T., Sørensen S. S., Christensen J. F. S., Christensen R., Jensen L. R., Bockowski M., Bauchy M., Smedskjaer M. M. Bond switching in densified oxide glass enables record-high fracture toughness. *ACS Applied Materials & Interfaces* **13**, 17753-17765 (2021).