Glasses with Temperature- and Pressure-Independent Elastic Moduli

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Normal glasses such as the most common soda-lime (window) glass, have a negative temperature derivative and a positive pressure derivative of elastic moduli, while abnormal glasses like silica and silica-rich glass behave in the opposite way. It would be natural to imagine that there are intermediate glasses with elastic moduli independent of temperature and/or pressure.

Guided by their computer simulations, Liping Huang's team at Rensselaer demonstrated that such intermediate glasses can be obtained by pressure-quenching or by chemical modifications. The structure and properties of normal, abnormal and intermediate glasses were studied by using *in-situ* high pressure/high temperature Raman and Brillouin light scattering techniques.

By preparing glasses using the pressure quenching route, their structure and properties can be tuned in a controllable way. With increasing of quenching pressure, the thermo-mechanical anomalies of silica rich glasses gradually diminish and eventually disappear, glasses with temperature- and pressure-independent elastic moduli can be obtained. Such glasses will be more resistant to thermal and mechanical impacts.