

Structure and spatial heterogeneity of metallic glasses

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The lack of lattice periodicity has been the major obstacle for the characterization of glass structure. The theory of atomic-level stresses, derived from discrete density fluctuation, predicts that the constituent atoms in metallic glasses are not in an ideal random arrangement by close packing but suffer from stresses from surroundings. By utilizing angstrom-beam electron diffraction, we experimentally measured local atomic arrangements in metallic glasses and uncovered structure evolution from short-range order to medium-range order and long range disorder in real glass systems. The spatial heterogeneity is found to originate from the local geometric frustration, driven by atomic-level stresses.