**NEW NATURAL SHOCK-INDUCED POST-STISHOVITE POLYMORPHS OF SILICA: IMPLICATIONS TO PHASE TRANSITIONS.**

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Until very recently, coesite and stishovite were the only naturally reported dense polymorphs of silica. We are investigating naturally densified silica grains in the heavily shocked SNC meteorite Shergotty. The grains display an orthogonal intergrowth of several sets of lamellae of very dense silica glass and a new high-pressure orthorhombic polymorph of silica with a structure consistent with a Pbcn or Pca21 space group (a =4.16± 0.03 Ä, b =5.11 ± 0.04 Ä, c =4.55 ± 0.01, cell volume V=96.91 ± 0.63 Ä3) Ä. Further investigations revealed the presence of an additional very dense polymorph whose x-ray diffraction pattern could be indexed in terms of a monoclinic lattice that is related to the baddeleyite-type structure with the cell parameters a = 4.375 Å, b = 4.584 Å, c = 4.708 Å, ß = 99.97, r (calc.) = 4.30 g/cm3. Both x-ray diffraction and HRTEM of the same grains indicate a multiphase intergrowth of the orthorhombic polymorph, the monoclinic polymorph, stishovite, dense glass, and cristobalite. The intergrowth is suggestive of an assemblage produced during decompression from a high shock state. The multicomponent silica grains display radiating cracks initiating at their surfaces and penetrating deep into the Shergotty matrix (= 600 microns) indicative of volume increase due to relaxation upon decompression. It is conceivable that such an assemblage is a good candidate to explore for the presence of decompression quench phases and ultimately trace their very high-pressure parental phases.