

Bond switching from two- to three-dimensional polymers of C₆₀ at high pressure

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Abstract: In situ high pressure x-ray diffraction experiments revealed that a transformation from the two-dimensional (2D) tetragonal C₆₀ polymer to a three-dimensional (3D) polymer takes place via a highly anisotropic deformation of C₆₀ molecules along the c axis, as an irreversible first-order transformation above 20 GPa. In the 3D polymer phase, the 2+2 bonds remain in the 2D plane, while neighboring layers are connected by the 3+3 bonds. The bulk modulus of the 3D polymer was 407 GPa, being slightly smaller than that of diamond.

Index Keywords: alcohol; carbon; diamond; helium; methanol; polymer; anisotropy; article; chemical bond; chemical modification; chemical structure; molecule; polymerization; pressure; X ray diffraction

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