SACADA Database Code: 549

Topology: 4^3T24-CA

# of independent nodes (IN): 3
Transitivity: [3785]
Space Group: P63/mmc
Pearson: hP36
Coordination Number (CN): 4

Year: 2021

Data

Name	Pressure, GPa	Density, g/cm³	Gap, eV	Relative energy, eV/atom	Bulk, GPa	Shear, GPa	Vickers, GPa	Refs
4^3T24-CA (SACADA #549)		3.420		0.169	424.1	458.4	85.0	SACADA[1]
4^3T24-CA								doi: 10.1038/s41524-021-00491-y

Elasticity tensor (kBar)[1]

11264.3786	1095.0142	689.0235	0.0000	0.0000	-0.0000
1095.0142	11264.3786	689.0235	0.0000	-0.0000	0.0000
689.0235	689.0235	10722.2271	0.0000	0.0000	-0.0000
0.0000	0.0000	0.0000	5084.6822	-0.0000	0.0000
-0.0000	0.0000	0.0000	-0.0000	3890.8303	0.0000
-0.0000	0.0000	0.0000	0.0000	0.0000	3890.8302

[1] We apply the density functional theory (DFT) approach by using the Vienna Ab Initio Simulation Package (VASP) to calculate the total energy and properties of carbon allotropes.

DFT calculations

We apply the density functional theory (DFT) approach by using the Vienna Ab Initio Simulation Package (VASP) package [6] to calculate the total energy of carbon allotropes. The Generalized Gradient Approximation [7] (GGA) for exchange-correlational functional is used everywhere. The energy cutoff set to 600 eV. Fully automatic Γ-centered k-points mesh with a reciprocal-space resolution of $2\pi \times 0.025$ Å^{-1} is applied. We used tetrahedron method with Blöchl corrections to perform the k-point integration. The convergence thresholds are set at 10^{-6} eV for energy and 10^{-5} eV Å^{-1} for ionic forces. Polycrystalline elastic moduli — the bulk modulus, the shear modulus, Young's modulus, and the Poisson's ratio ν — have been calculated within the Voigt–Reuss–Hill [8] approximation. The Vicker's hardness H_v has been estimated according to Oganov's model [9].