**SACADA Database Code: 586**

Topology: $4^3$T162-CA

# of independent nodes (IN): 3
Transitivity: [39(11)5]
Space Group: C2/m
Pearson: mS24
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 |
|---|---|---|---|---|---|---|---|---|
| $4^3$T162-CA (SACADA #586) | | 3.276 | | 0.304 | 394.1 | 382.8 | 67.5 | SACADA[1] |
| $4^3$T162-CA | | | | | | | | doi: 10.1038/s41524-021-00491-y |

## Elasticity tensor (kBar)[1]

| | | | | | |
|---|---|---|---|---|---|
| 9465.6373 | 1741.7570 | 1102.7287 | -0.0000 | 0.0000 | -290.4270 |
| 1741.7570 | 7691.3994 | 1187.1308 | 0.0000 | 0.0000 | 199.6393 |
| 1102.7287 | 1187.1308 | 10429.7201 | 0.0000 | -0.0000 | -575.0492 |
| -0.0000 | 0.0000 | 0.0000 | 3333.1494 | -516.4743 | 0.0000 |
| 0.0000 | -0.0000 | -0.0000 | -516.4743 | 3524.3437 | -0.0000 |
| -290.4270 | 199.6393 | -575.0492 | 0.0000 | -0.0000 | 4660.3793 |

[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].