Supplementary information

Is graphitic silicon carbide (silagaphene) stable?

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Fig. S1. Close-up of the total electron density map for the AA’ stacking with a larger supercell which clearly shows the sandwich arrangement

Fig. S2. Energy minimization curve using the density mixing approach for AA’ stacking

Fig. S3. The phosphorene-type SiC with orthohobmic Cmc2\(_1\) structure (unstable AA’)

Sandwiched flat-buckled hybrid (metastable)

Phosphorene-type SiC with orthohobmic Cmc2\(_1\) structure (unstable)

Tetrahedral SiC (stable)
Fig. S4. Imaginary acoustic modes in the phonon dispersion of the sandwiched flat-buckled hybrid (metastable AA')
Fig. S5. Phonon dispersion of bulk graphitic SiC along the G-M-K-G path (soft modes near the gamma point are numerical artifacts and disappear in sufficiently large supercells with finer grids, see below)
Fig. S6. IR footprint of AB’ siligraphite versus that of 3C-SiC

Fig. S7. Density of Phonon States for bilayer and trilayer AA and AB shows how the addition of layers shifts the ultralow frequency acoustic modes (ZA) toward imaginary values (below zero)
Fig. S8. A close-up of the CBM in monolayer silagaphene

Fig. S9. Band structure of bulk graphitic SiC along the G-M-K-G path shows the indirect and direct gaps more clearly.
Fig. S10. A series of HRTEM micrographs showing onion-like features that exhibit admixture of several interlayer spacing, but predominantly 3.7 Å. The outlined region shows superposition of two onions.
Fig. S11. Line profiles taken from a slightly puckered onion along with its FFT pattern. The scatter plot at the end summarizes the repeating measurements of interlayer spacing.
Fig. S12. A pair of HRTEM micrographs showing an onion before (top) and after (bottom) the growing diamond-like core tears it open from within.