

Supplementary Information

Nodal chain network, intersecting nodal rings and triple points coexisting in Ba_3Si_4

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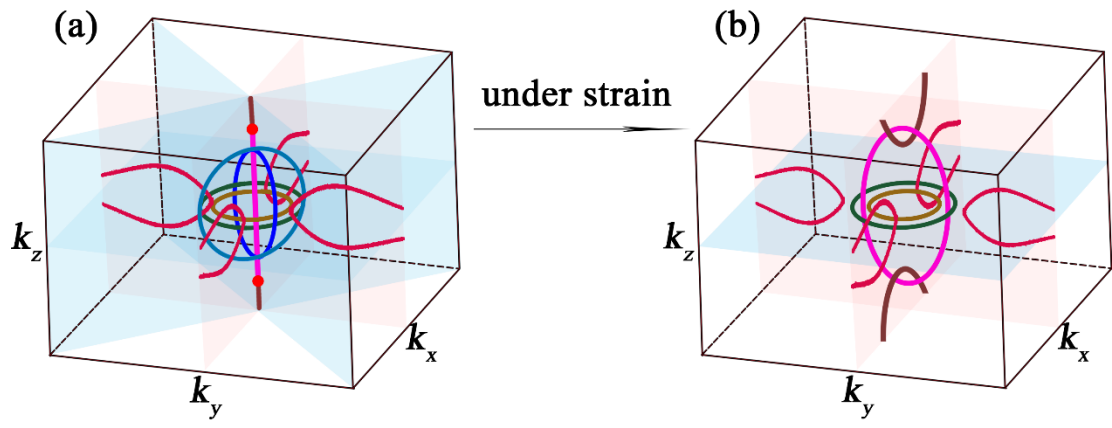


FIG. S1. (a) and (b) A whole topological phase for the structure without strain and under strain, respectively.

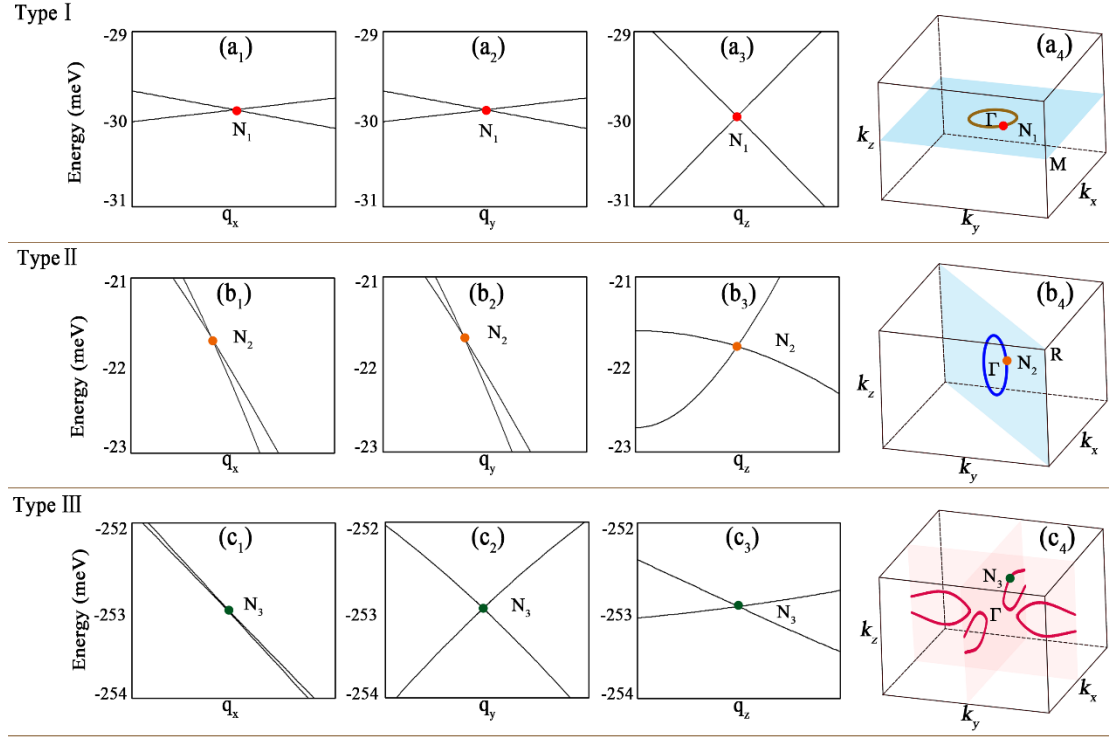


FIG. S2. (a₁-a₃) Band structures along three different directions parallel to $k_{x/y/z}$ for the point N_1 on the nodal ring (on the plane $k_z = 0$) in (a₄), which belongs to type-I nodal ring. (b₁-b₃) Band structures along three different directions parallel to $k_{x/y/z}$ for the point N_2 on the nodal ring (on the plane $k_x = k_y$) in (b₄), which belongs to type-II nodal ring. (c₁-c₃) Band structures along three different directions parallel to $k_{x/y/z}$ for the point N_3 on the nodal ring (on the plane $k_y = 0$) in (c₄), which belongs to type-III nodal ring.

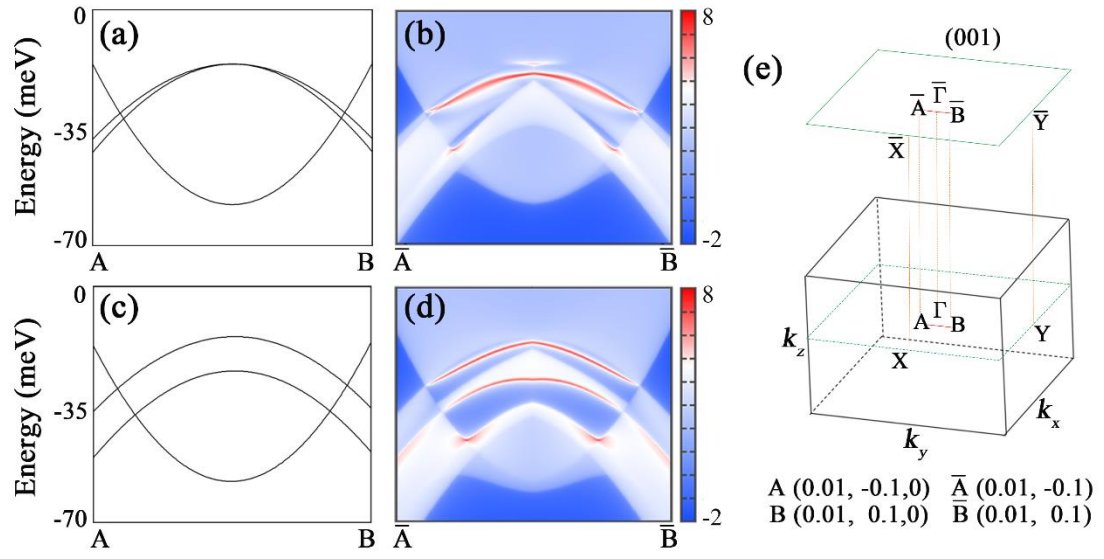


FIG. S3. Bulk band structure along A-B (a) and surface band structure along $\bar{A} - \bar{B}$ on [001] surface (b) for Ba_3Si_4 in the case of no strain. Bulk band structure along A-B (c) and surface band structure along $\bar{A} - \bar{B}$ on [001] surface (d) for Ba_3Si_4 under strain. (e) Bulk BZ and corresponding surface BZ, where the high-symmetry points and k paths are labeled.

	Without strain	With strain
Name	P42/MNM	PNNM
International Tables	136	58
Long Name	P42/M21/N2/M	P21/N21/N2/M
Identity	x y z	x y z
Rotation Axis	-x -y z	-x -y z
	y x -z	
	-y -x -z	
Mirror plane	x y -z	x y -z
	-y -x z	
	y x z	
Glide plane	x+1/2 -y+1/2 z+1/2	x+1/2 -y+1/2 z+1/2
	-x+1/2 y+1/2 z+1/2	-x+1/2 y+1/2 z+1/2

Table S1 Symmetry elements of Ba₃Si₄ without/with strain.