Supplemental Materials：

Tunable polarization properties of charge, spin, and valley in Janus VSiGeZ_4 (Z= N, P, As) monolayers

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TABLE SI. The calculated elastic constants C_{ij} of VSi_2Z_4, VGe_2Z_4, and Janus $VSiGeZ_4$ in unit of N/m.

	C_{11}	C_{12}	C_{66}
VSi_2N_4	509.186	154.833	177.176
VSi_2P_4	207.034	47.595	79.720
VSi_2As_4	175.202	44.758	65.222
VGe_2N_4	409.370	136.996	136.187
VGe_2P_4	177.692	41.998	67.874
VGe_2As_4	142.668	54.071	44.298
$VSiGeN_4$	459.149	144.078	157.536
$VSiGeP_4$	194.442	57.213	68.614
$VSiGeAs_4$	155.385	45.645	54.870

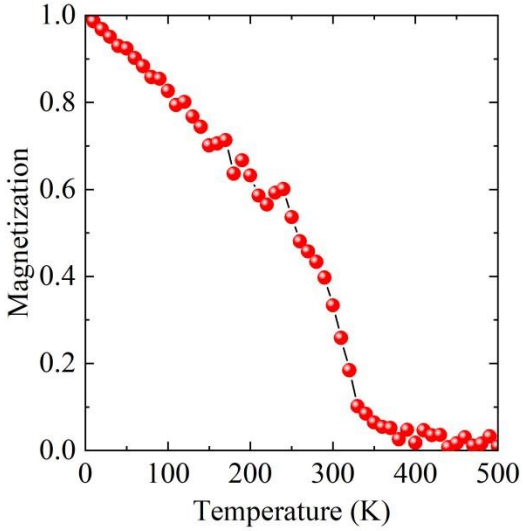

FIG. S1 The magnetization of $VSiGeN_4$ with temperature.

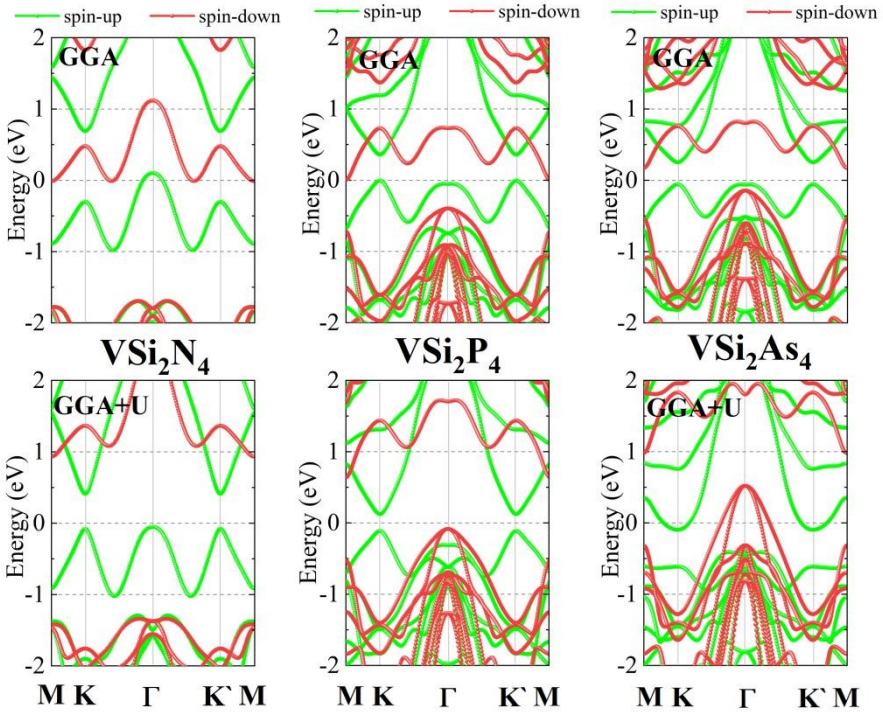

FIG. S2 Spin polarized band structure of VSi_2Z_4 by using GGA and GGA+U methods.

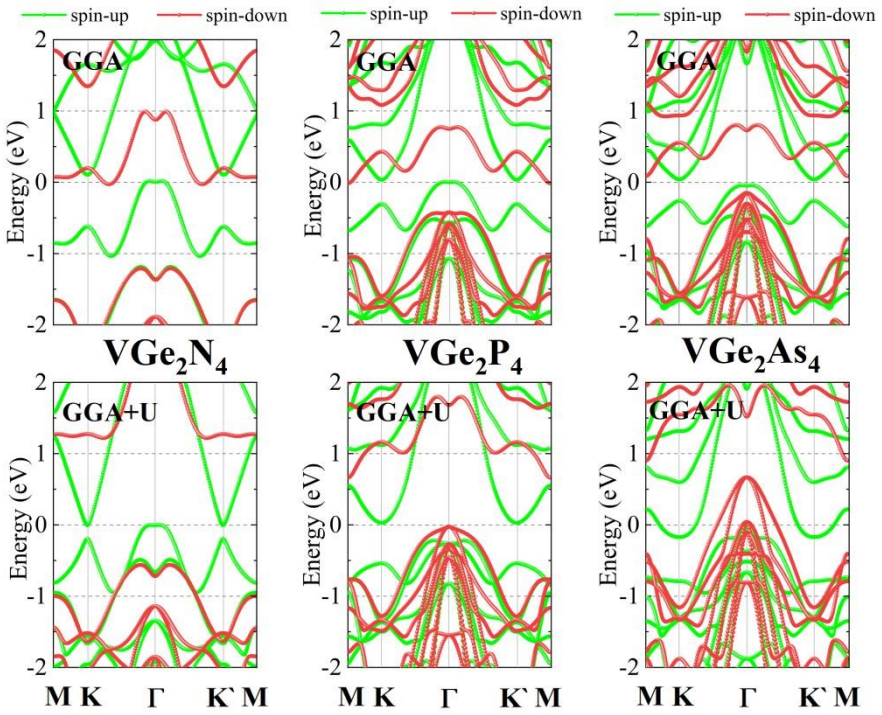

FIG.S3. Spin polarized band structure of VGe_2Z_4 by using GGA and GGA+U methods.

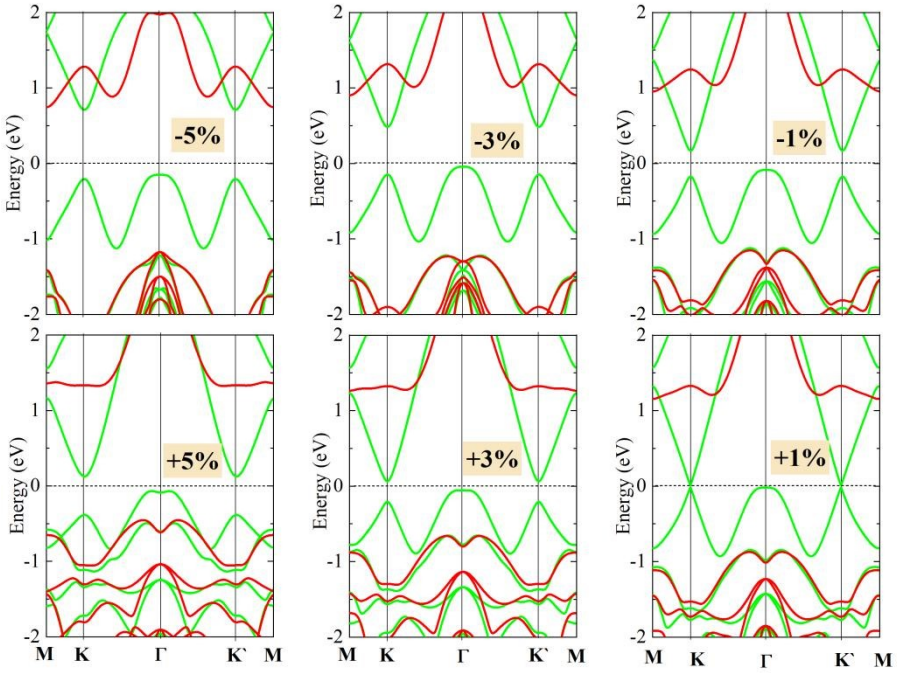

FIG. S4 Spin polarized band structure of the strained $VSiGeN_4$.

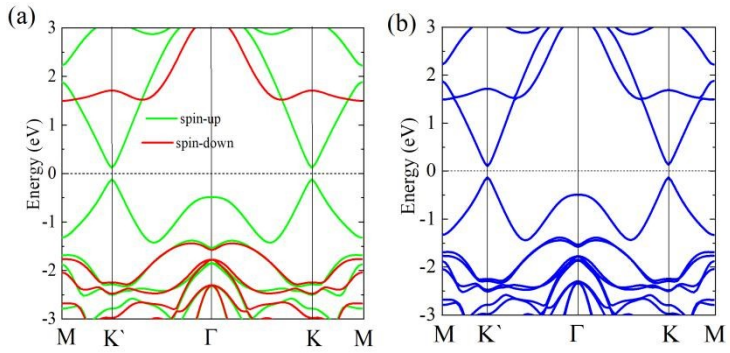

FIG. S5. (a)Spin polarized band structure and (b) band structure with SOC of the strained $VSiGeN_4$ by using HSE06 level.

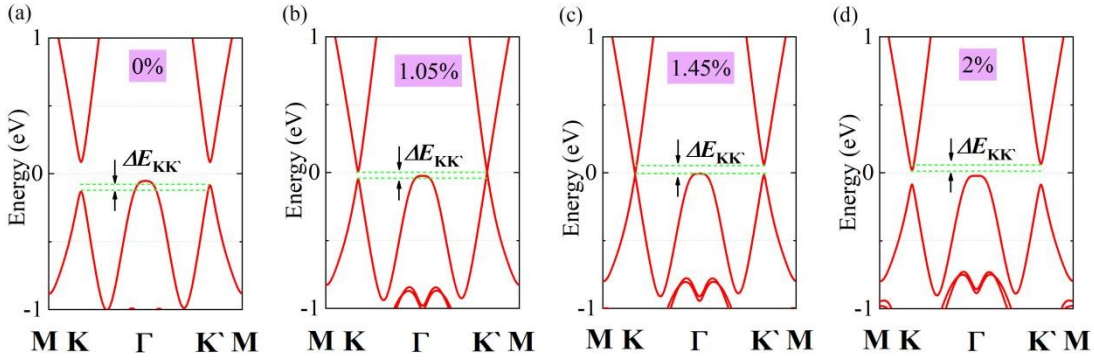

FIG. S6 Band structure of $VSiGeN_4$ under compressive strain ε = 0%, +1.05%, +1.45%, and +2%.

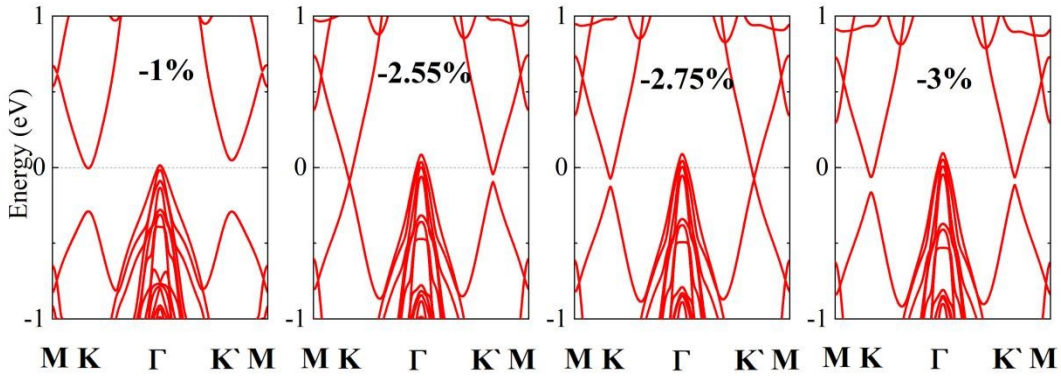

FIG. S7. Band structure of $VSiGeP_4$ under compressive strain ε = -1%, -2.55%, -2.75%, and -3%.