

### Supporting Information

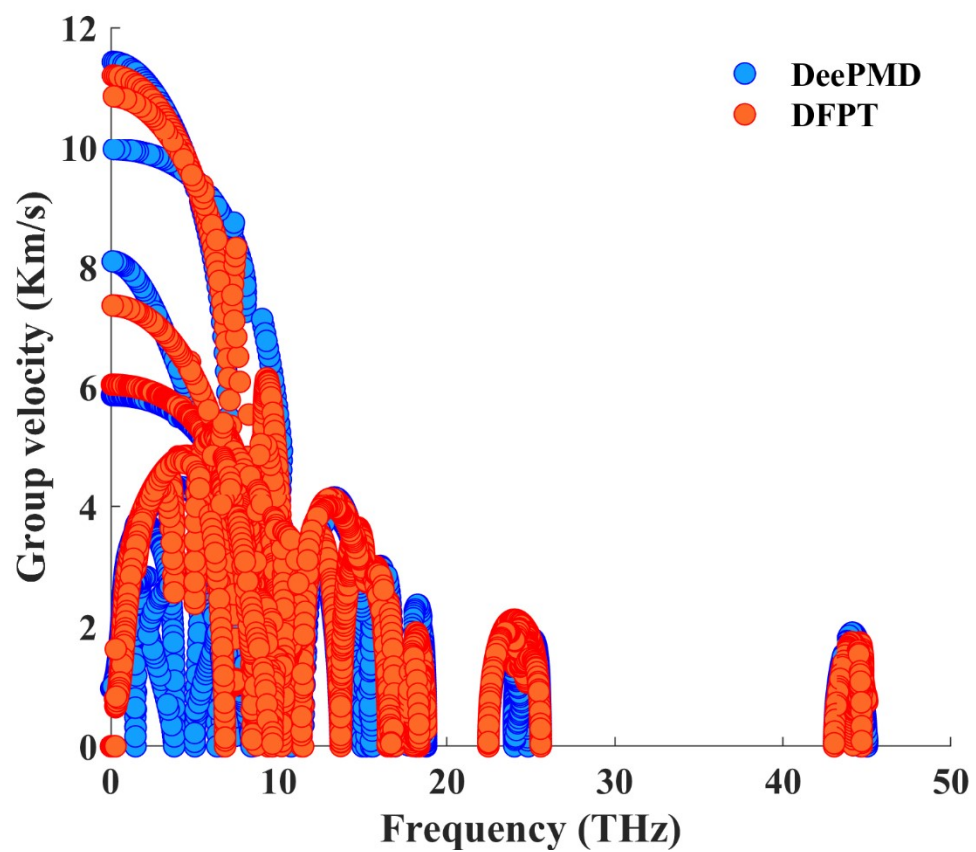


Figure S1: Phonon group velocity calculated from DFPT calculation and deep learning potential.

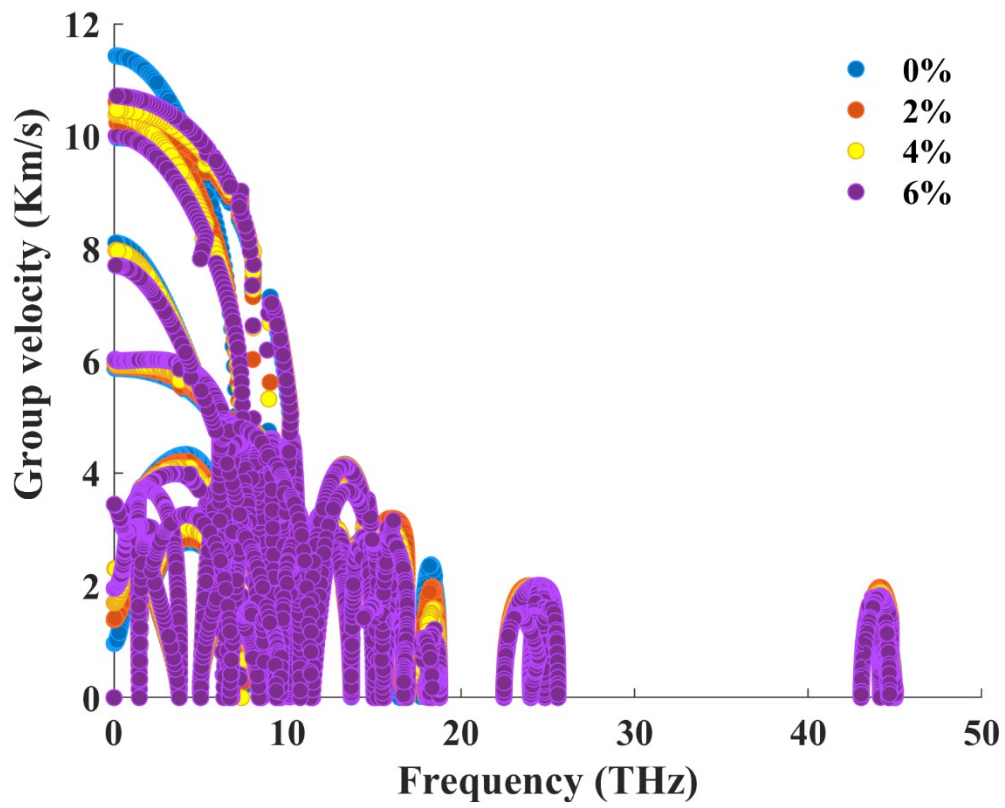


Figure S2: The effect of applied mechanical strain (%) on the phonon group velocity calculated from DLP

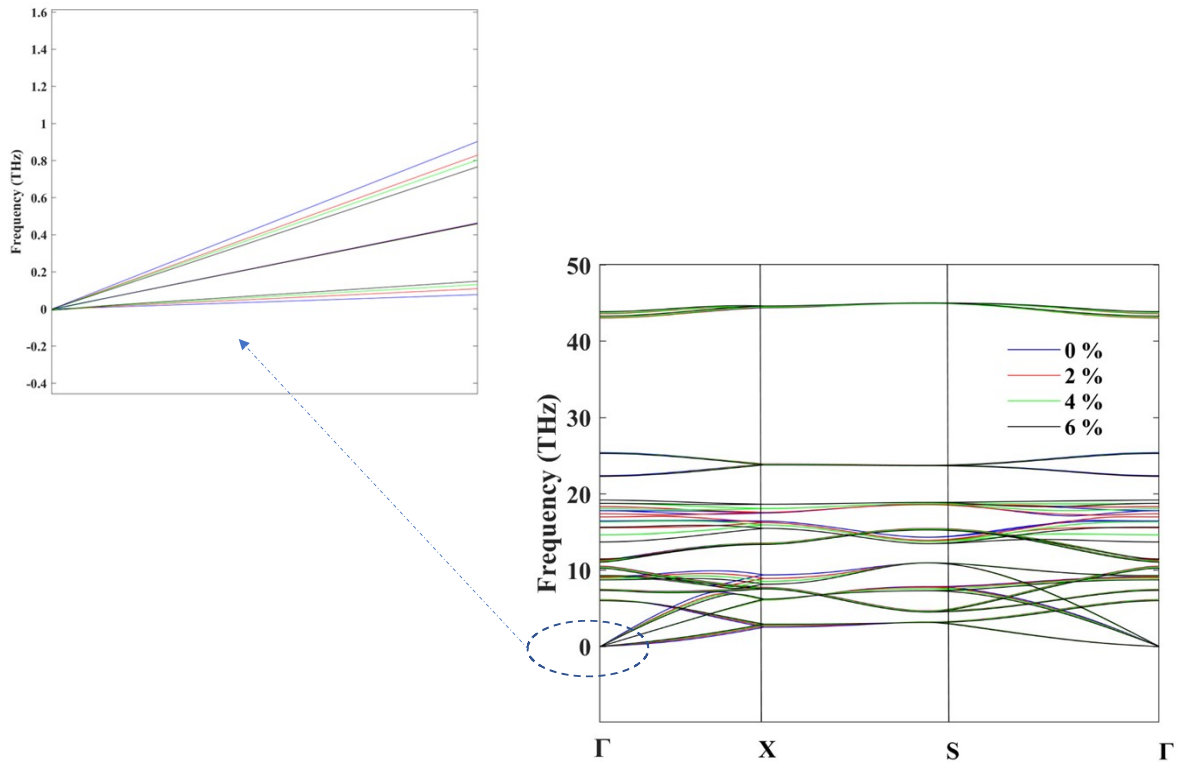


Figure S3: Phonon dispersion relation of penta-NiN2 at different applied strains calculated from DLP