

Figure S1. The phonon spectra of (a) monolayer graphene and (b) CoNG are presented

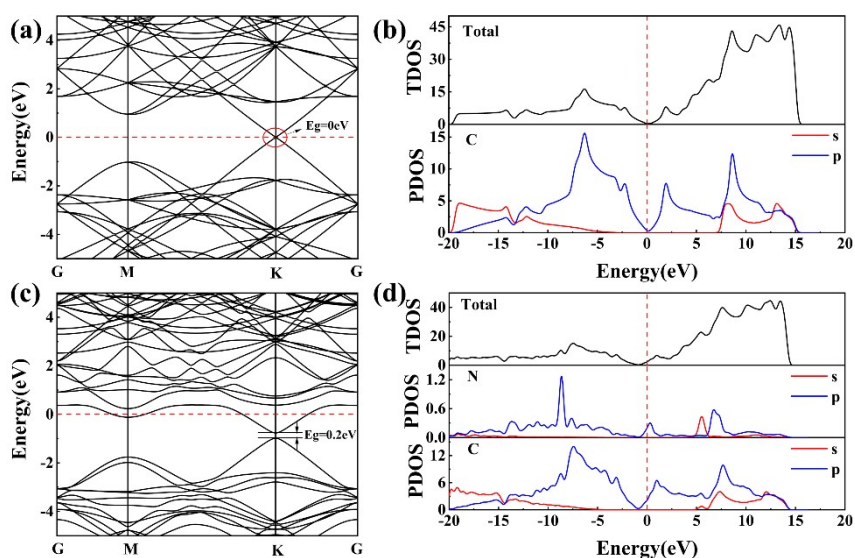


Figure S2. The electronic band structure and density of states of (a)-(b) monolayer graphene and (c)-(d) N-doped graphene are presented

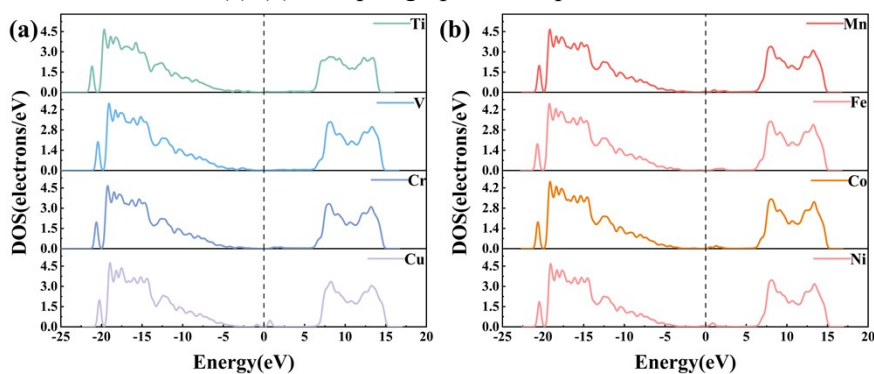


Figure S3. Density of states of C 2s in each doped system

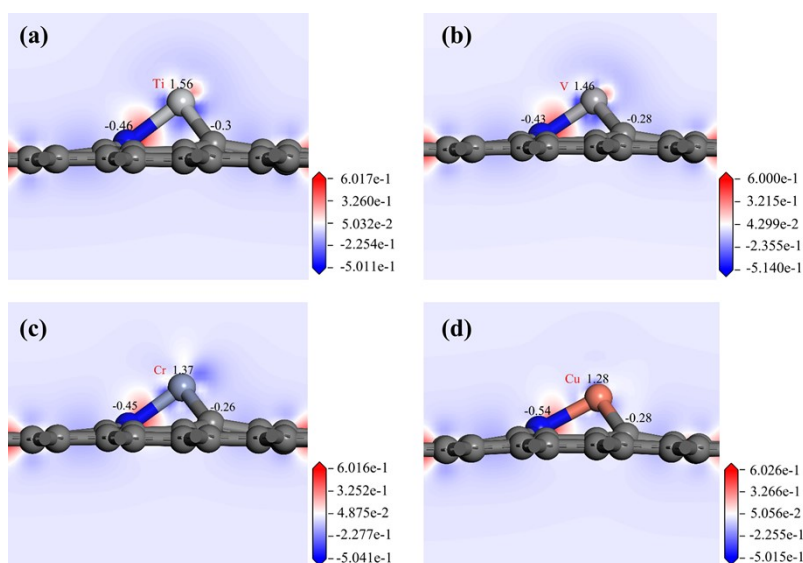


Figure S4. Charge difference density and Mulliken diagrams; (a) Ti; (b) V; (c) Cr; (d) Cu

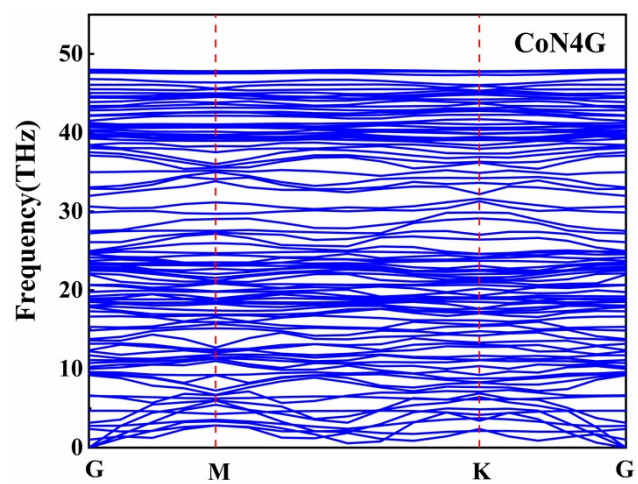


Figure S5. Phonon spectrum of CoN_4G

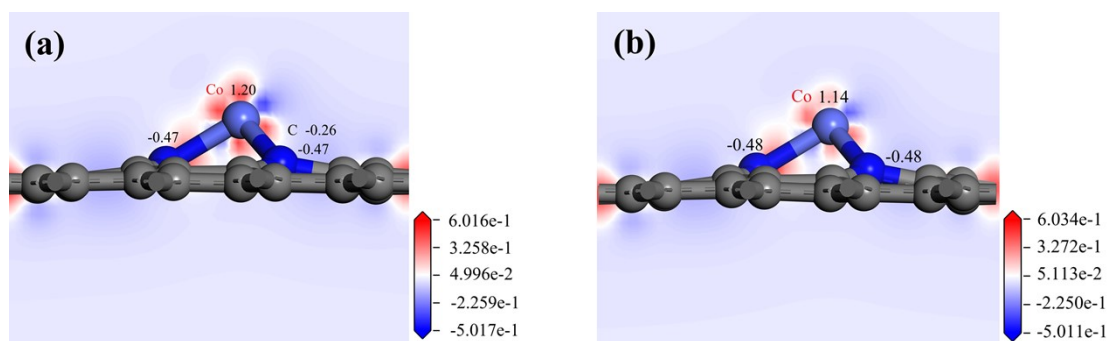


Figure S6. Charge difference density and Mulliken diagrams; (a) CoN_2G , (b) CoN_3G