Supplementary Material

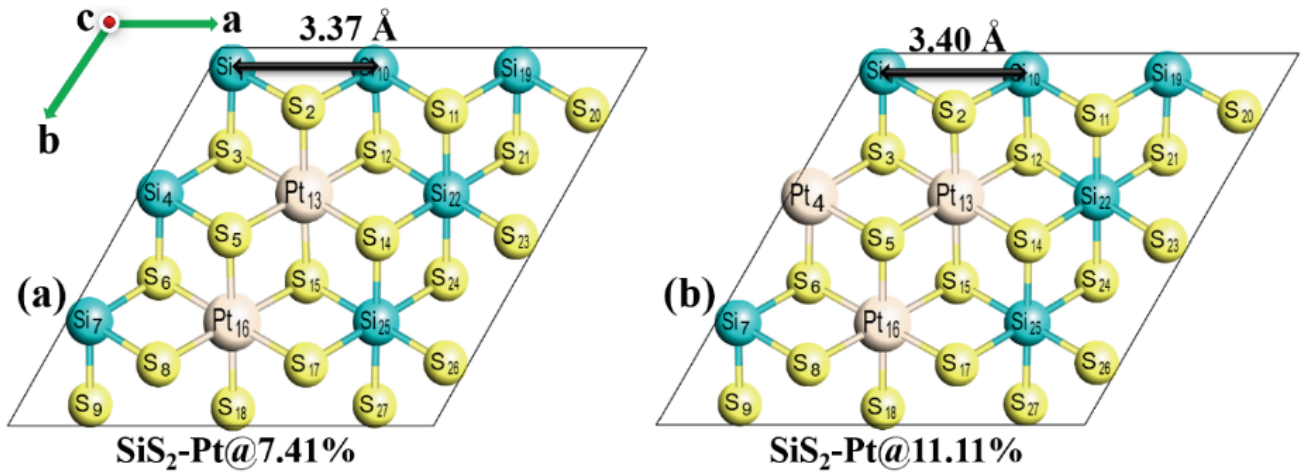

Figure S1: Showing the increase in the lattice constant with the increased percentage doping concentration. (a) two and (b) three Pt-atom doped SiS_2 monolayer, respectively.

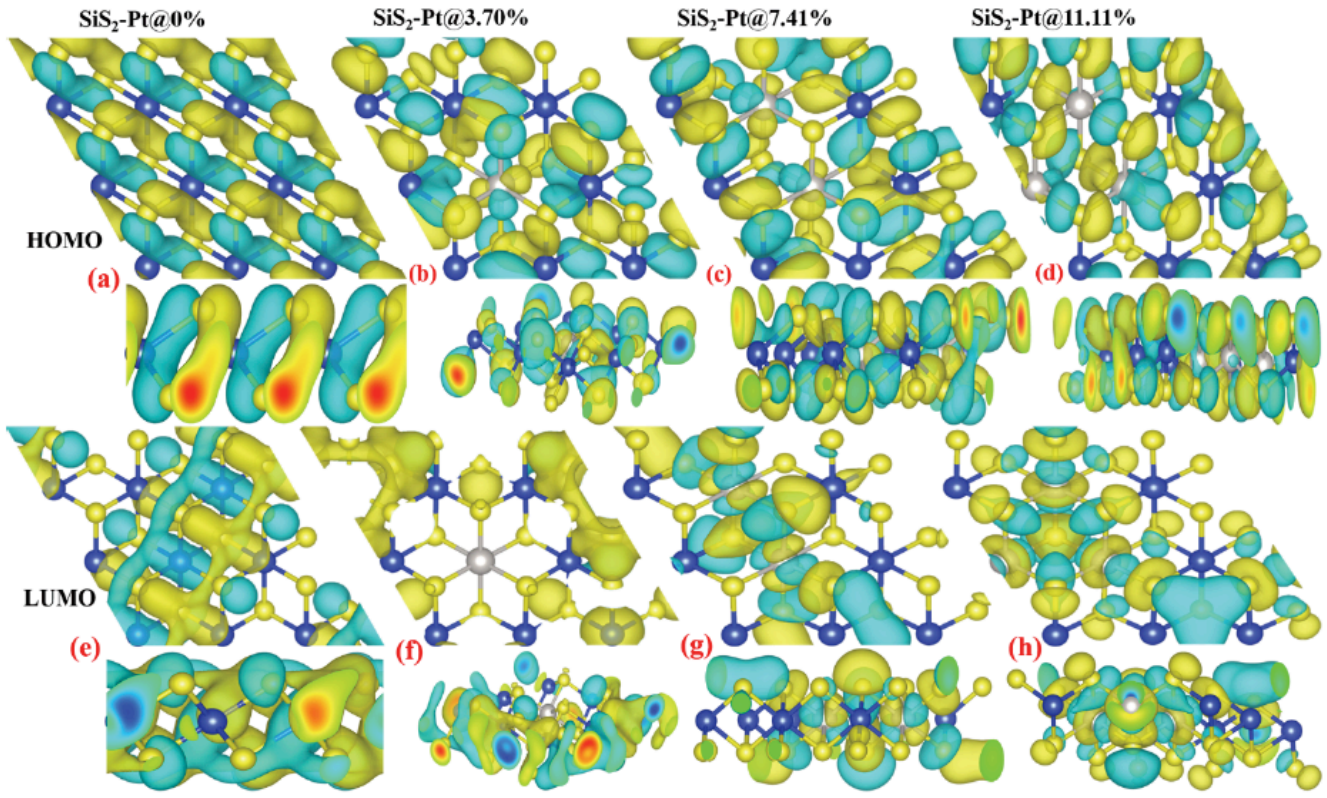

Figure S2: Frontier molecular orbitals of pure and doped SiS_2 systems with varying doping concentration. (**a**-**d**) highest occupied molecular orbitals (HOMO) and (e-h) lowest unoccupied molecular orbitals (LUMO).

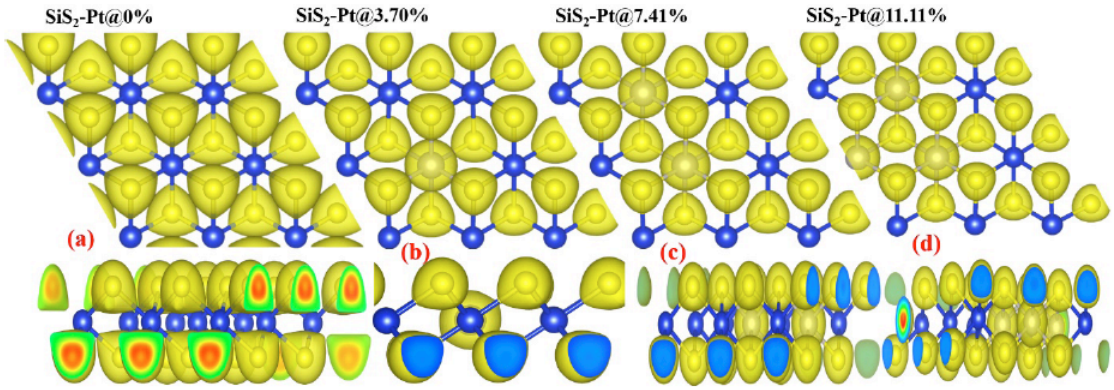

Figure S3: Total electron density in pure and doped SiS_2 monolayers. Isosurface values are set to their default values.

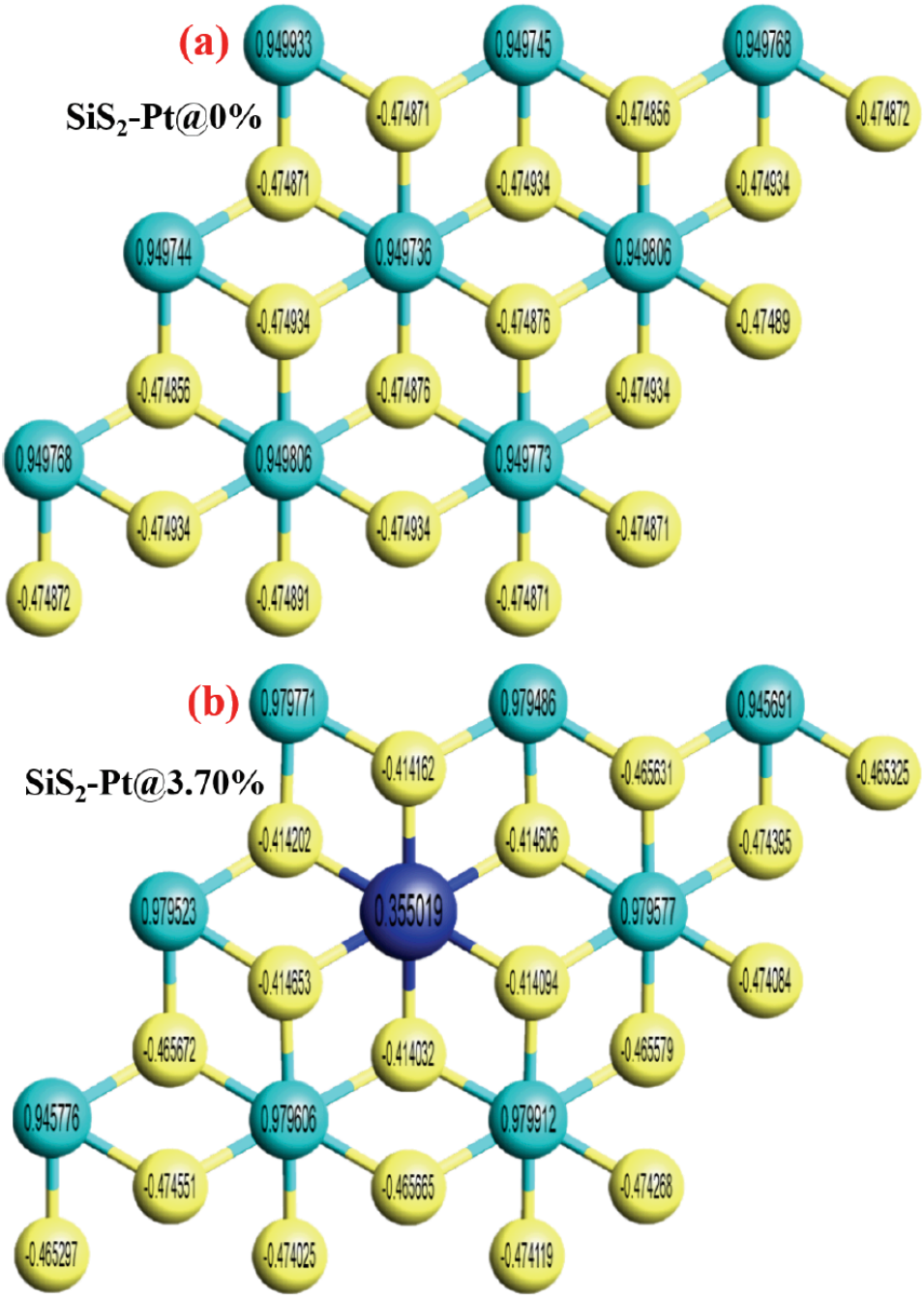

Figure S4: Net charge on each individual constituent atom using the Mulliken population analysis. (**a**) SiS_2-Pt@0% and (**b**) SiS_2-Pt@3.70%.

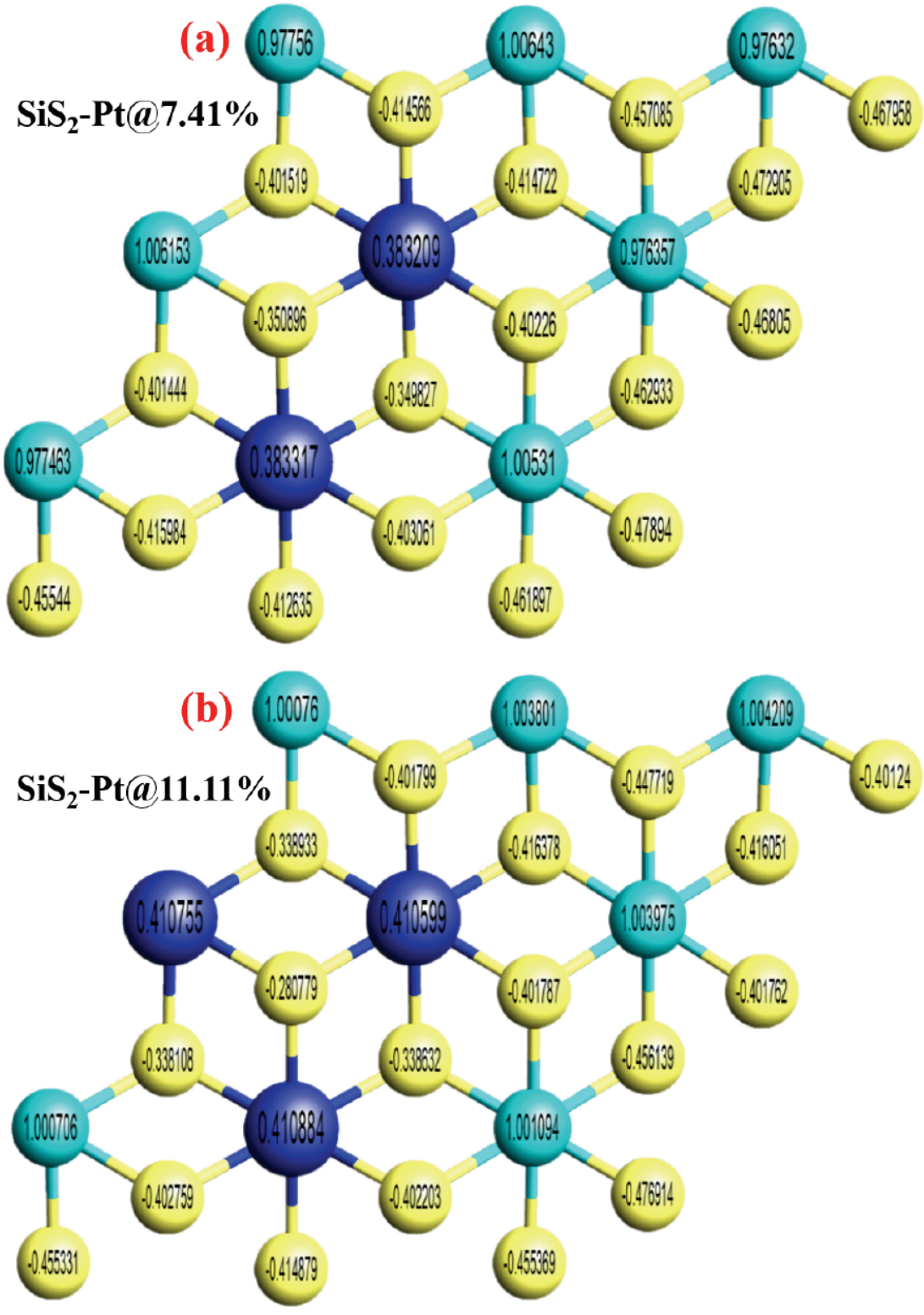

Figure S5: Net charge on each individual constituent atom using the Mulliken population analysis. (a) SiS_2-Pt@7.41% and (b) SiS_2-Pt@11.11%.

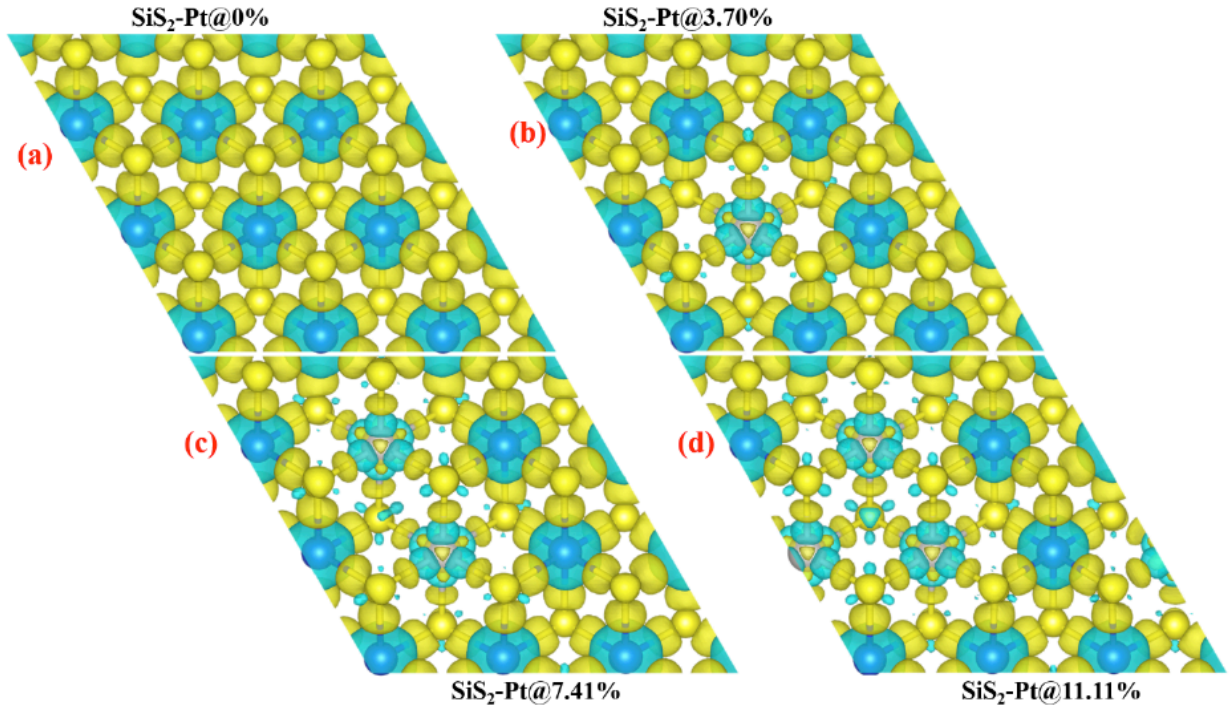

Figure S6: Difference electron densities calculated from atomic densities in pure and doped SiS_2 systems. Isosurface values are set to their default values. The blue color indicates an electron density rich region.

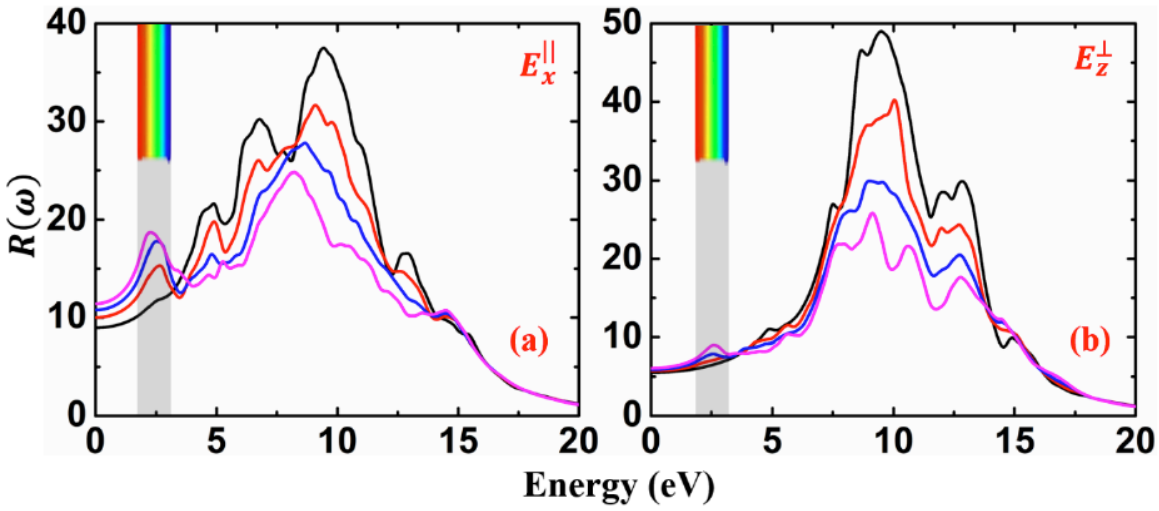

Figure S7: Reflection spectra in pure and doped SiS_2 monolayer materials along (a) x-direction and (b) z-direction, respectively.