

Electronic Supplementary Information (ESI)

Probing Lattice Vibration and Strain States in Highly Phosphorus-doped Epitaxial Si films

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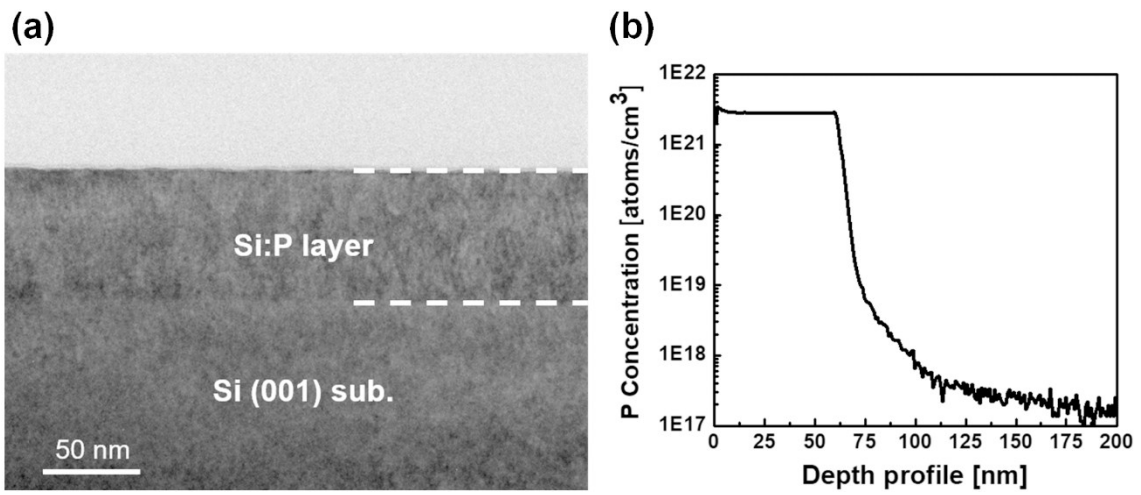


Figure S1. (a) A cross-sectional TEM image of the as-deposited epitaxial $\text{Si}_{0.938}\text{P}_{0.062}$ layer grown on Si (001) substrates (b) P depth profile of the as-deposited epitaxial $\text{Si}_{0.938}\text{P}_{0.062}$ layer grown on Si (001) substrates determined by SIMS measurements.

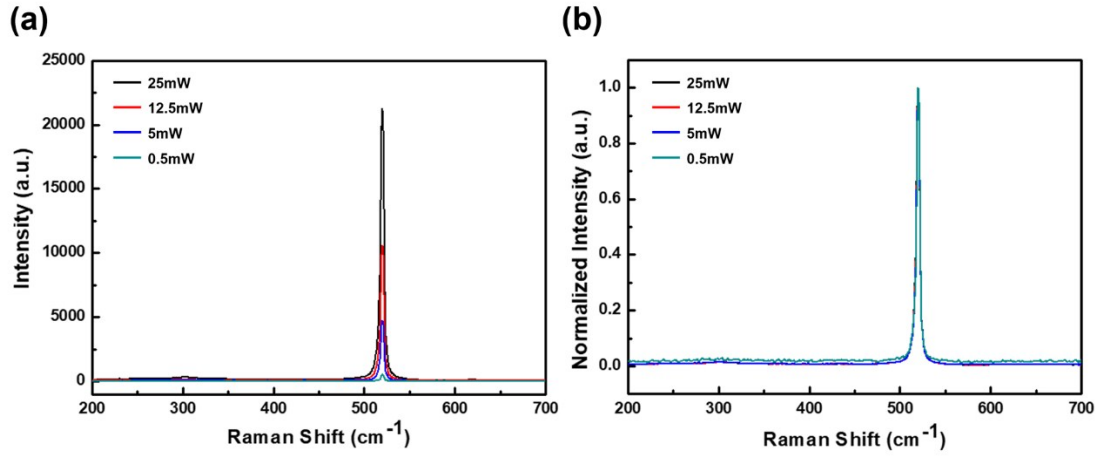


Figure S2. (a) Typical Visible Raman spectra of $\text{Si}_{0.938}\text{P}_{0.062}$ sample as a function of the incident laser power. (b) Normalized Visible Raman spectra of $\text{Si}_{0.938}\text{P}_{0.062}$ sample as a function of the incident laser power.

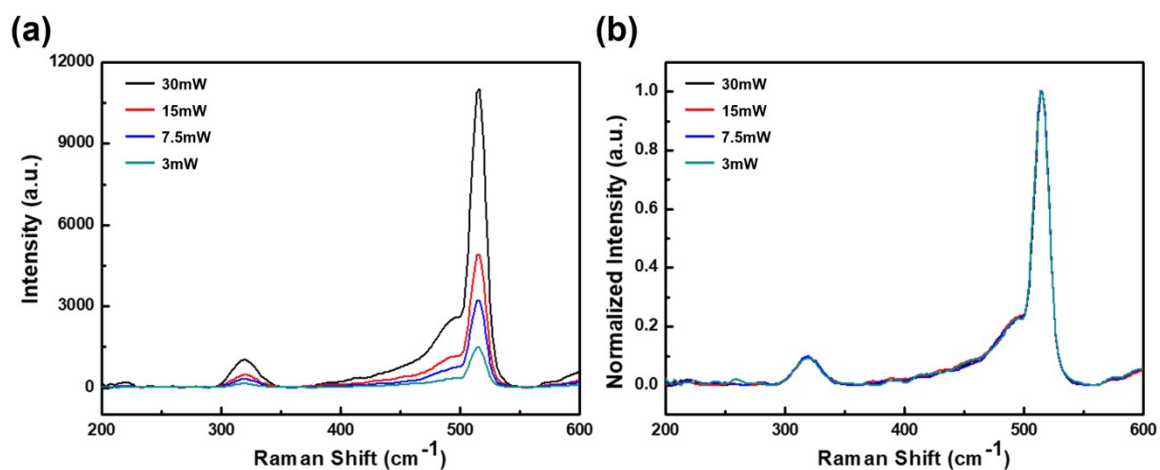


Figure S3. (a) Typical UV Raman spectra of $\text{Si}_{0.938}\text{P}_{0.062}$ sample as a function of the incident laser power. (b) Normalized UV Raman spectra of $\text{Si}_{0.938}\text{P}_{0.062}$ sample as a function of the incident laser power.

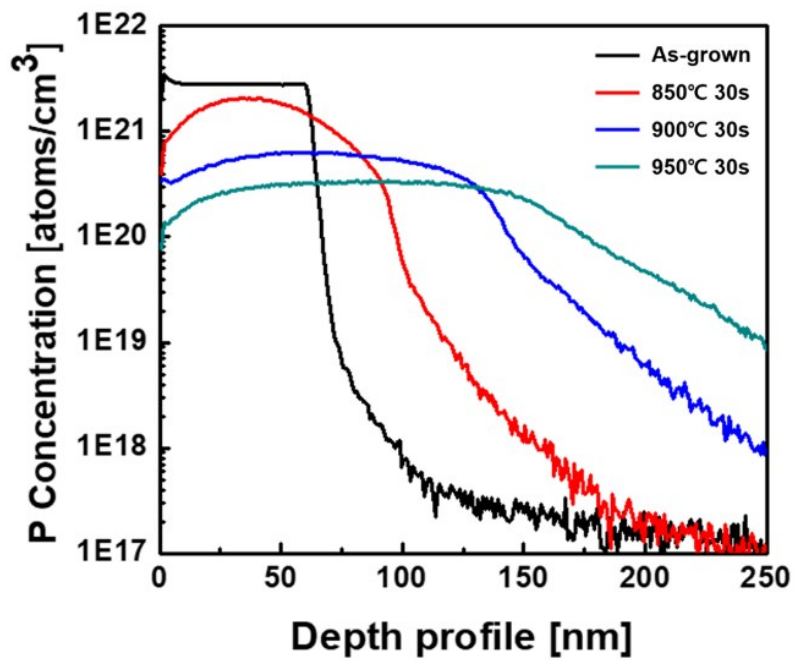


Figure S4. P depth profile of the as-grown and annealed $\text{Si}_{0.938}\text{P}_{0.062}$ samples determined by SIMS measurements.