**Supplementary information**

Phonon, plasmon and electronic properties of surfaces and interfaces of periodic W/Si and Si/W multilayers

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Fig. S1. Schematic representation showing top layers of Si and W in (a) W/Si and (b) Si/W multilayer structures, respectively, deposited over the monocrystalline Si (100) substrates; where $t_{Si}$, $t_W$ and $d$ – are thickness of Si, W and period, respectively.
Fig. S2. Raman scattering of alternate Si layer embedded in the periodic W/Si multilayer structures; (a₁) to (a₁₀) represents thickness of the alternate Si layer: (a₁) 0.5 nm (a₂) 0.8 nm (a₃) 1.4 nm (a₄) 1.75 nm (a₅) 2.3 nm (a₆) 2.4 nm (a₇) 3 nm (a₈) 3.5 nm (a₉) 4.4 nm and (a₁₀) 4.8 nm.
Fig. S3. Thickness dependent phonon scattering of alternate Si layer embedded in the periodic W/Si multilayer structures: (a₁) 0.5 nm (a₂) 0.8 nm (a₃) 1.4 nm (a₄) 1.75 nm (a₅) 2.3 nm (a₆) 2.4 nm (a₇) 3 nm (a₈) 3.5 nm (a₉) 4.4 nm and (a₁₀) 4.8 nm; peaks 6-TO\textsubscript{α-Si} and 7-TO\textsubscript{c-Si}. 
Fig. S4. Raman spectra of monocrystalline Si (100) substrate excited by laser wavelength of 473 nm.