Electronic Supplementary Material (ESI) for CrystEngComm.
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Supporting Information

Solid-source vapor growth and optoelectronic properties of arsenic-based layered group-IV monopnictides

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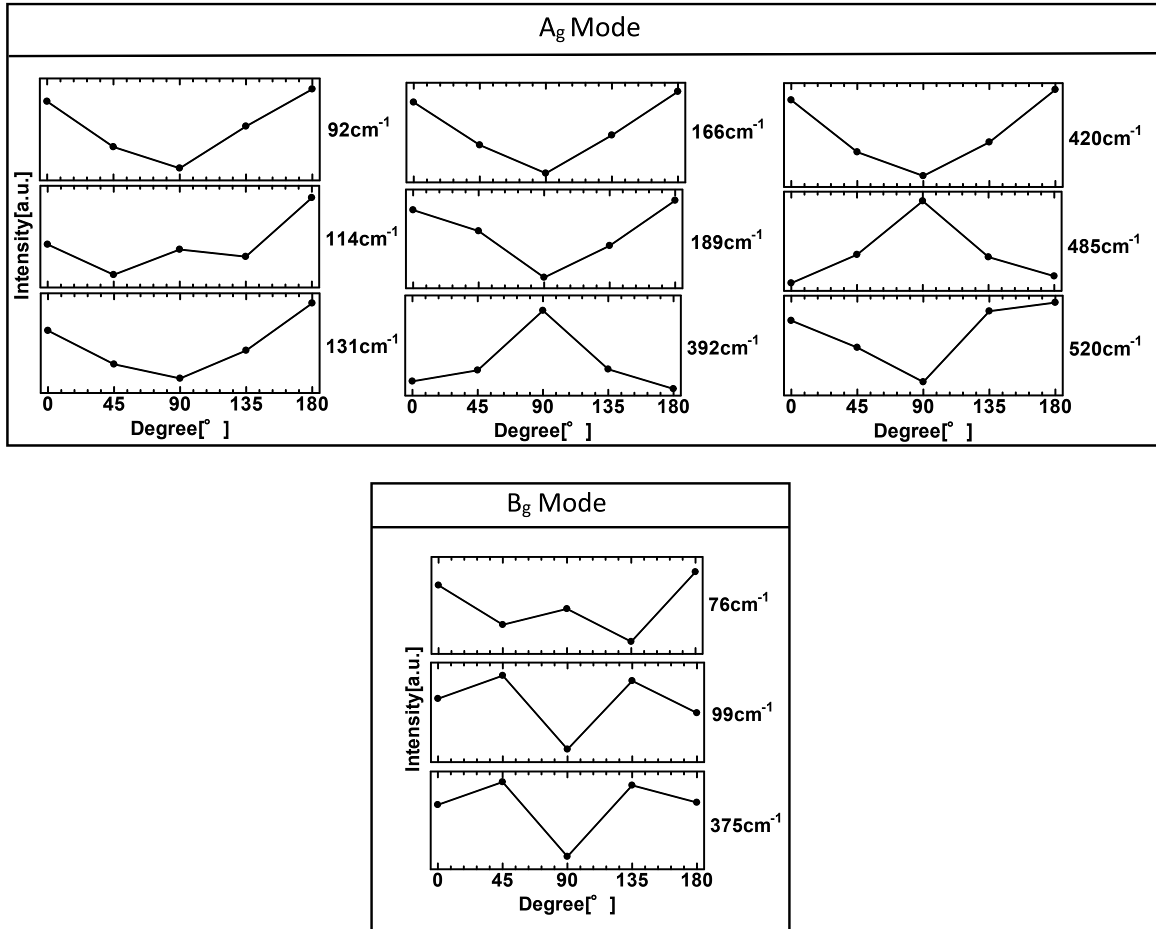
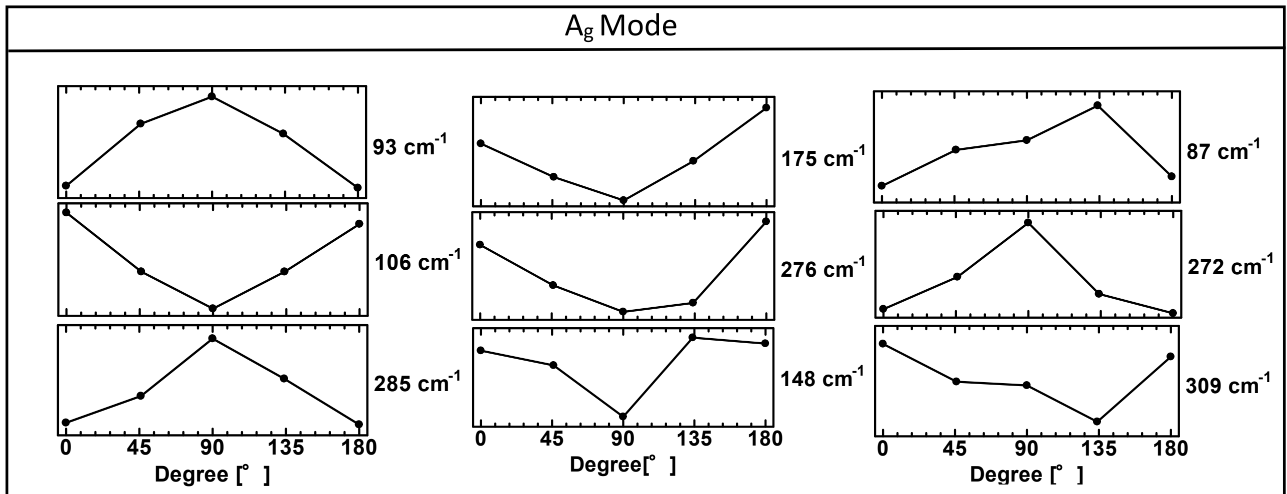


FIG. S1. For SiAs film, angle-dependent Raman intensities for the active vibrations of nine A_g modes and three B_g modes.



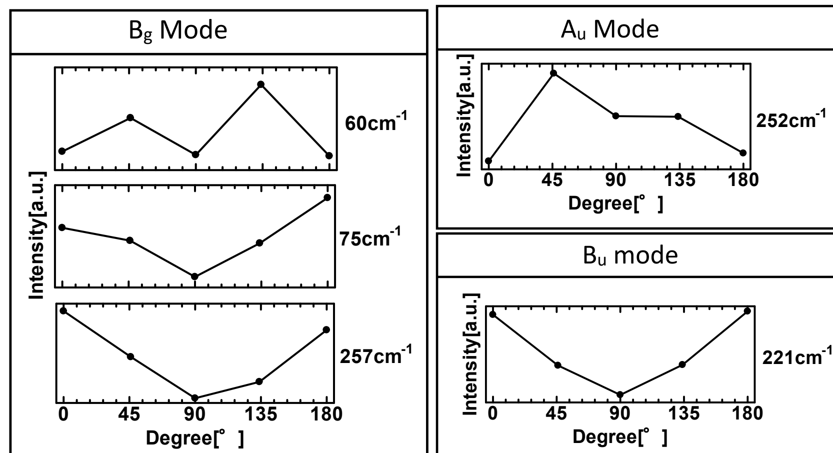
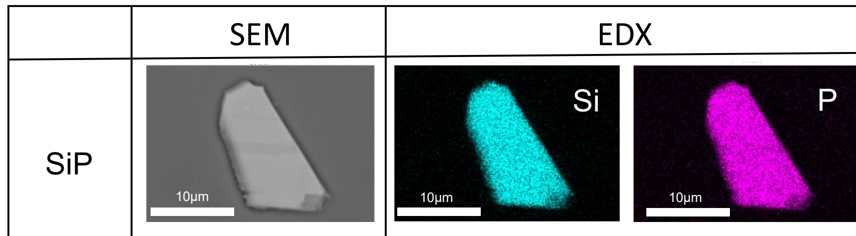
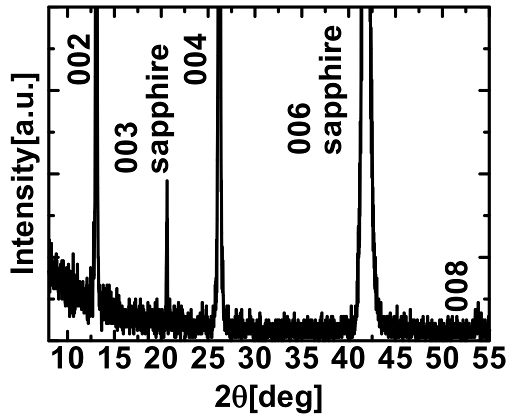
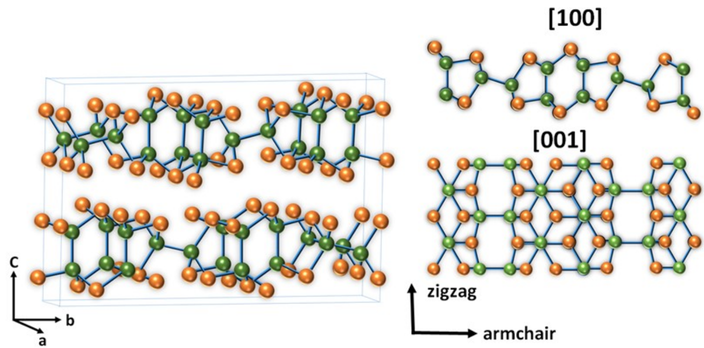
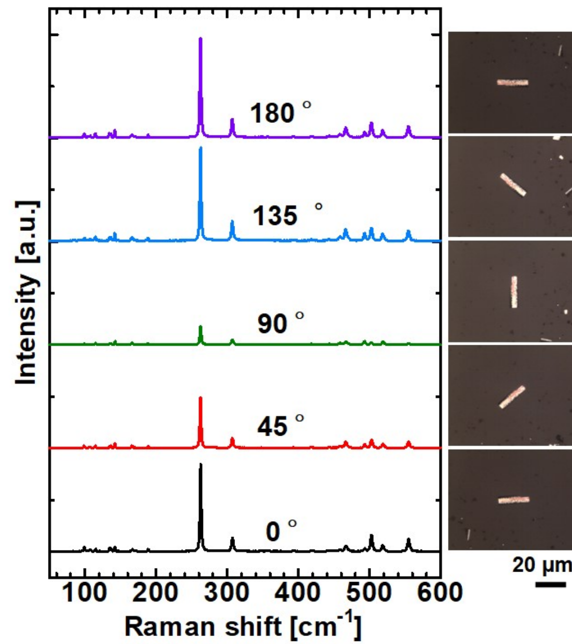


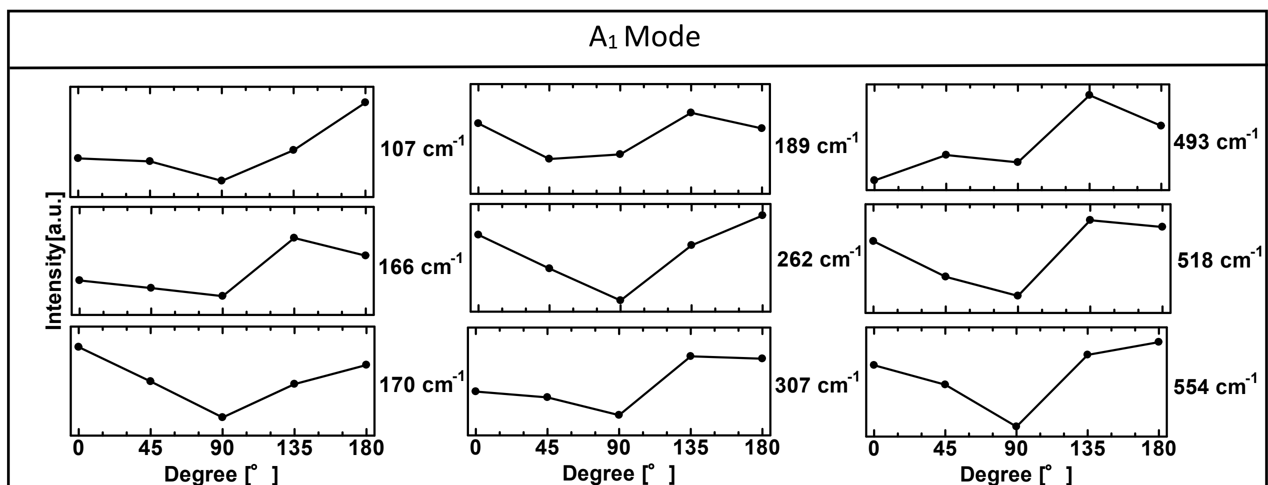
FIG. S2 For SiAs film, angle-dependent Raman intensities for the active vibrations of nine A_g modes and three B_g modes.


SEM
EDX
SiP
Si
P
10μm
10μm
10μm


002
003
sapphire
004
006
sapphire
008
Intensity[a.u.]
10 15 20 25 30 35 40 45 50 55
2θ[deg]


[100]
[001]
c
b
a
zigzag
armchair


180 °
135 °
90 °
45 °
0 °
Intensity [a.u.]
100 200 300 400 500 600
Raman shift [cm-1]
20 μm


A1 Mode
Intensity[a.u.]
107 cm-1
166 cm-1
170 cm-1
189 cm-1
262 cm-1
307 cm-1
493 cm-1
518 cm-1
554 cm-1
0 45 90 135 180
Degree [°]

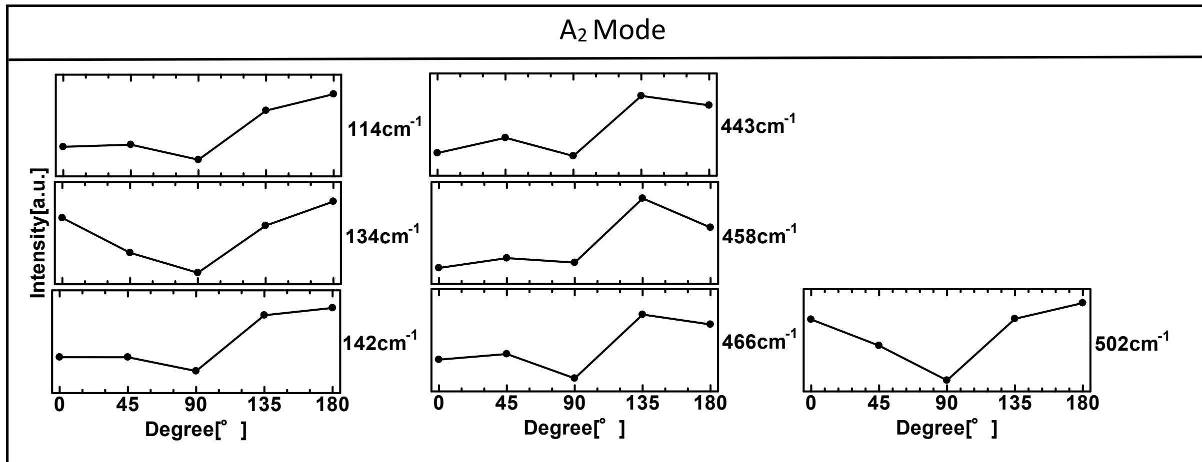
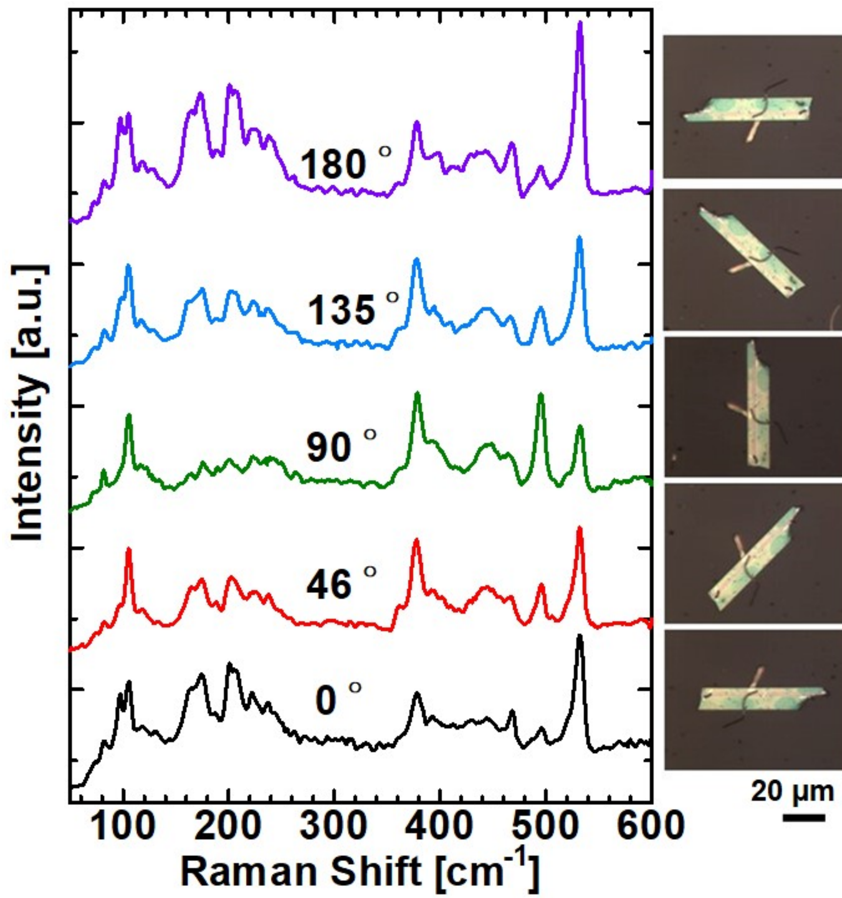
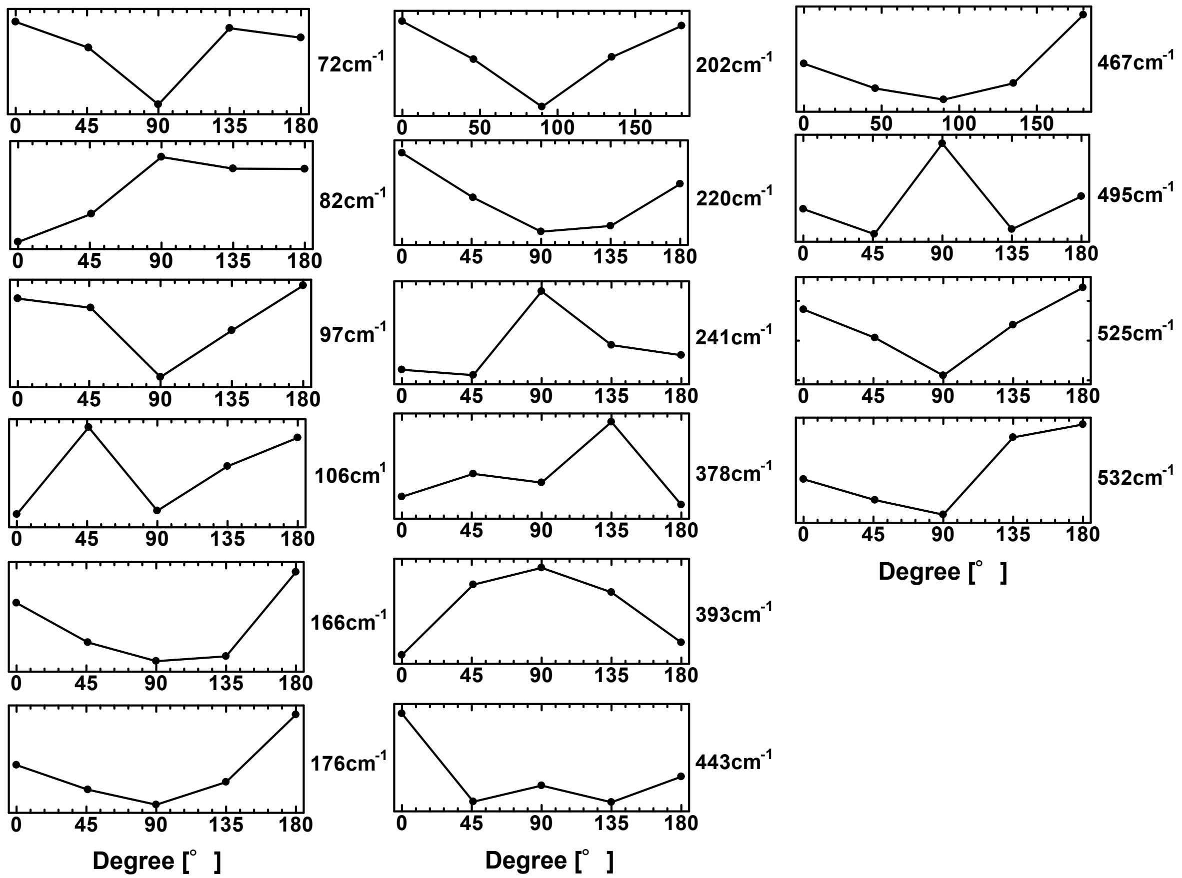


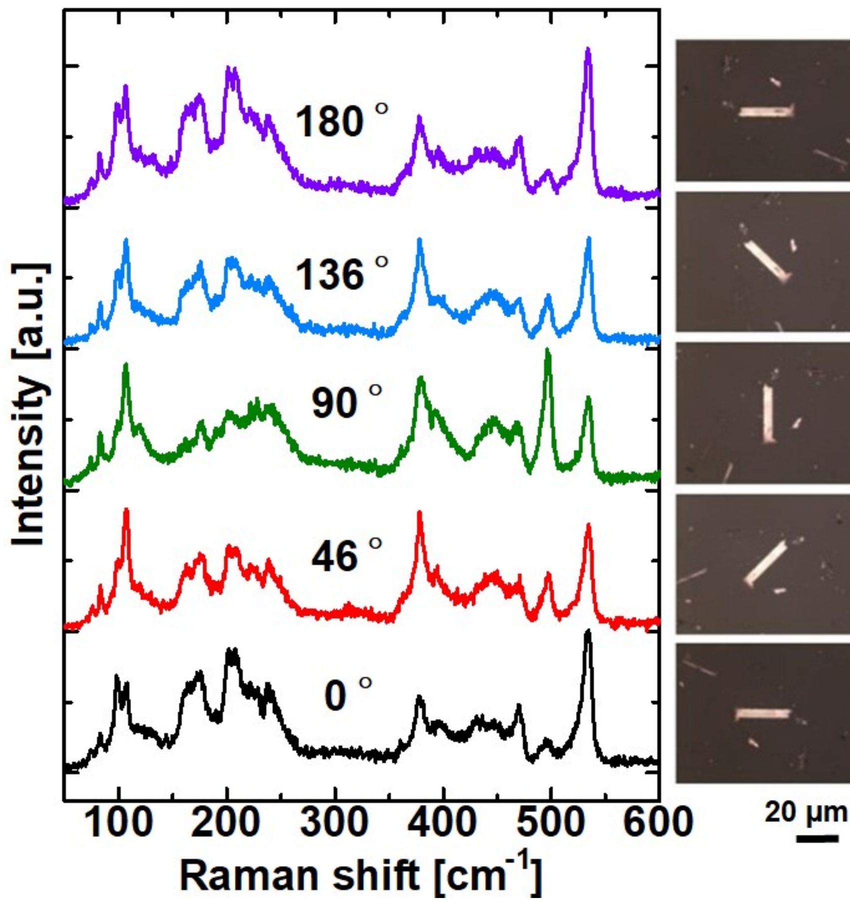
FIG. S3. SEM images with elemental analysis of EDX for SiP. XRD profile of wide-range symmetrical $\omega/2\theta$ scans for SiP film. Side view and top view for the crystal structure of layered SiP. The green and orange balls represent Si and P atoms, respectively. Angle-resolved Raman spectra of SiP rectangular films. The insets show the digital images of the film angle. Angle-dependent Raman intensities for the active vibrations of A_1 modes and A_2 modes.

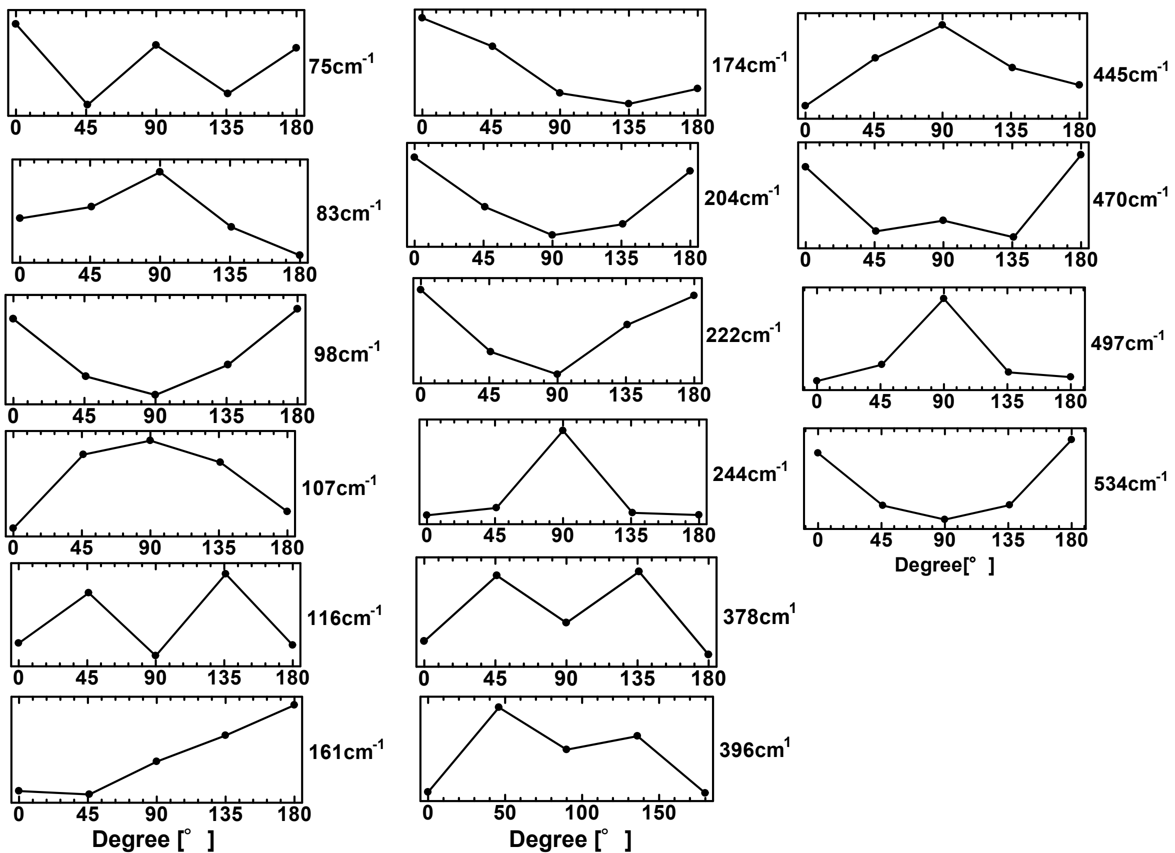
$SiAs_{0.74}P_{0.26}$



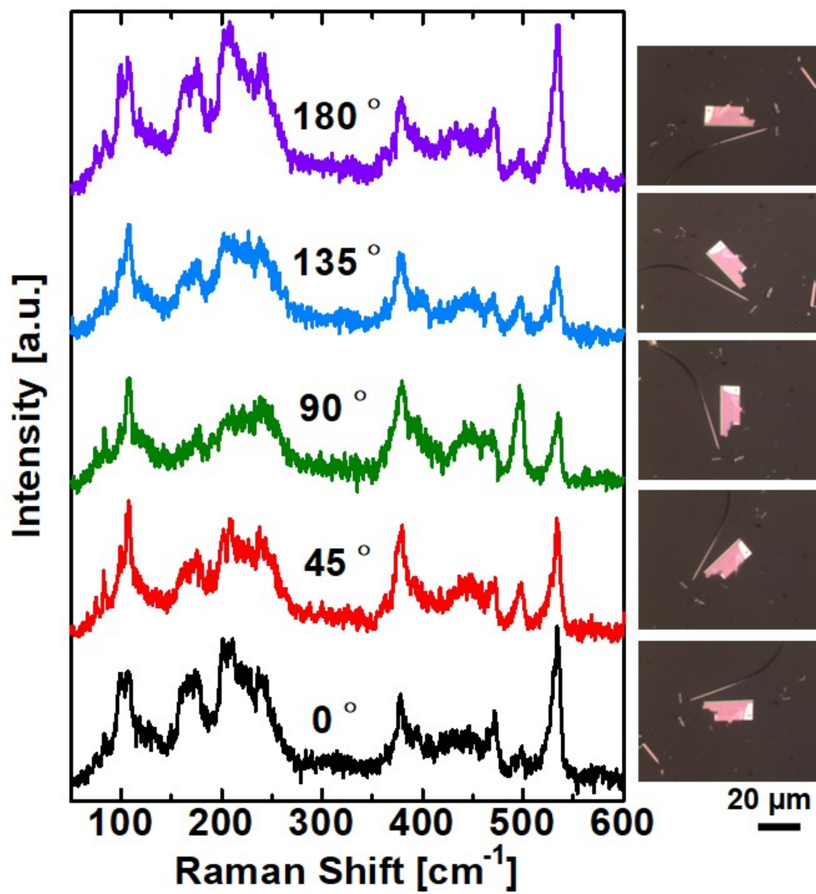


$SiAs_{0.71}P_{0.29}$





$SiAs_{0.71}P_{0.29}$



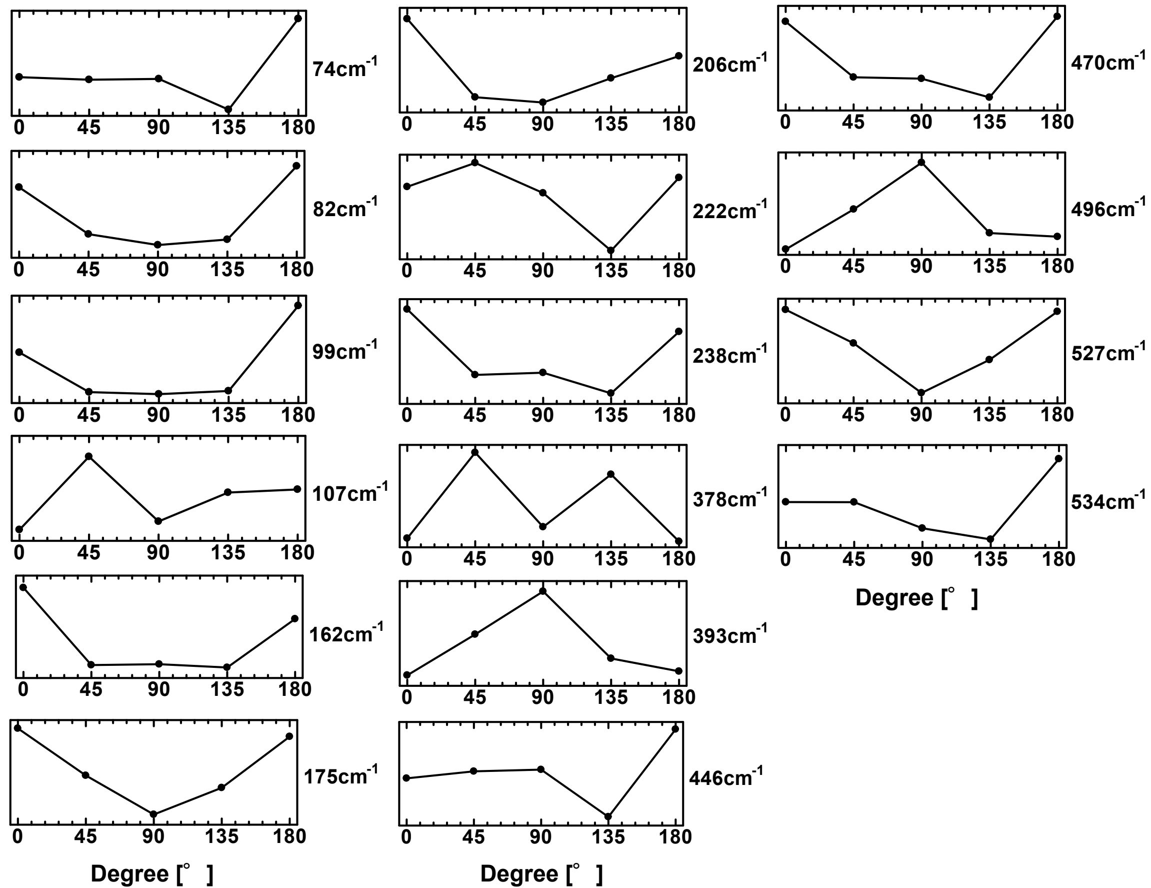
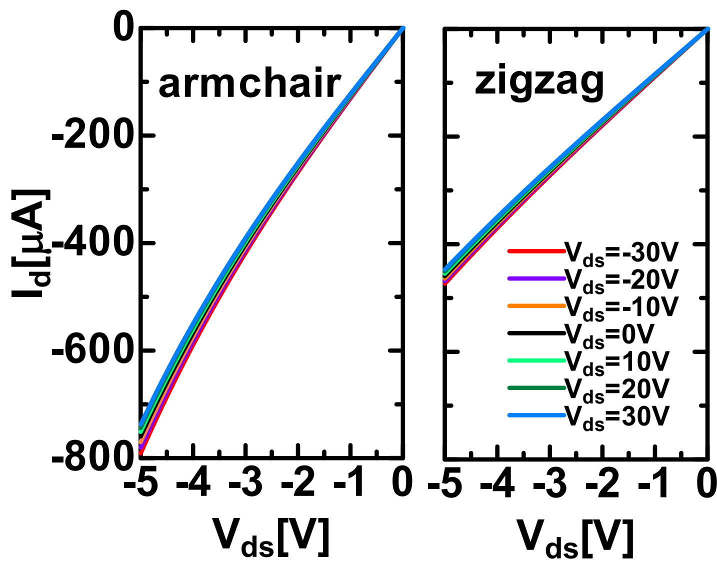


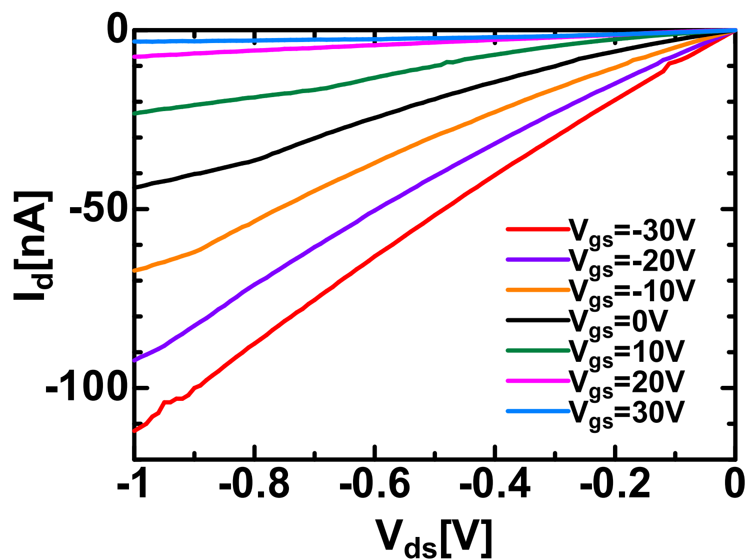
FIG. S4. Angle-resolved Raman spectra of SiAsP rectangular films with the As (P) composition of 0.74 (0.26), 0.71 (0.29) and 0.69 (0.31), respectively. The insets show the digital images of the film angle. Angle-dependent Raman intensities for the active vibrations.

Output characteristics of GeAs FETs

d=173 nm



d=81 nm



d=28 nm

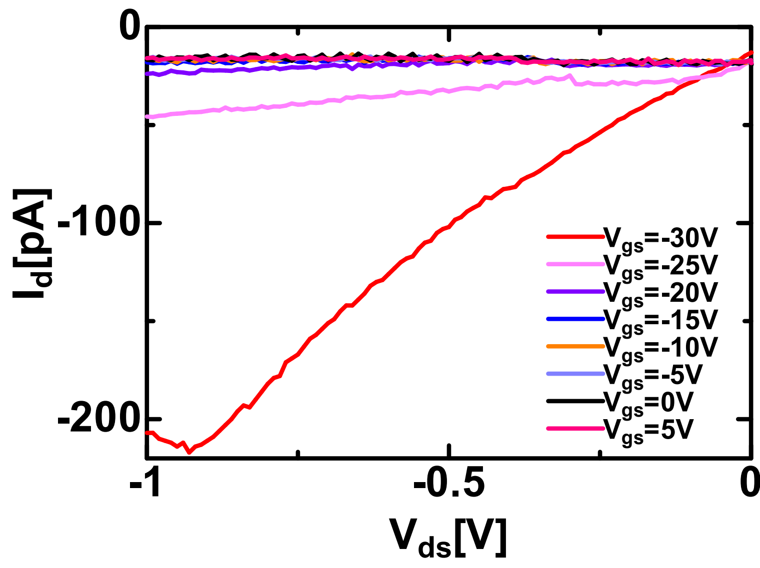


FIG. S5. Output characteristics of GeAs back-gate FETs with various film thickness (d = 28, 81 and 173 nm).