Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Curvature-dependent flexible light emissions from layered gallium selenide crystals

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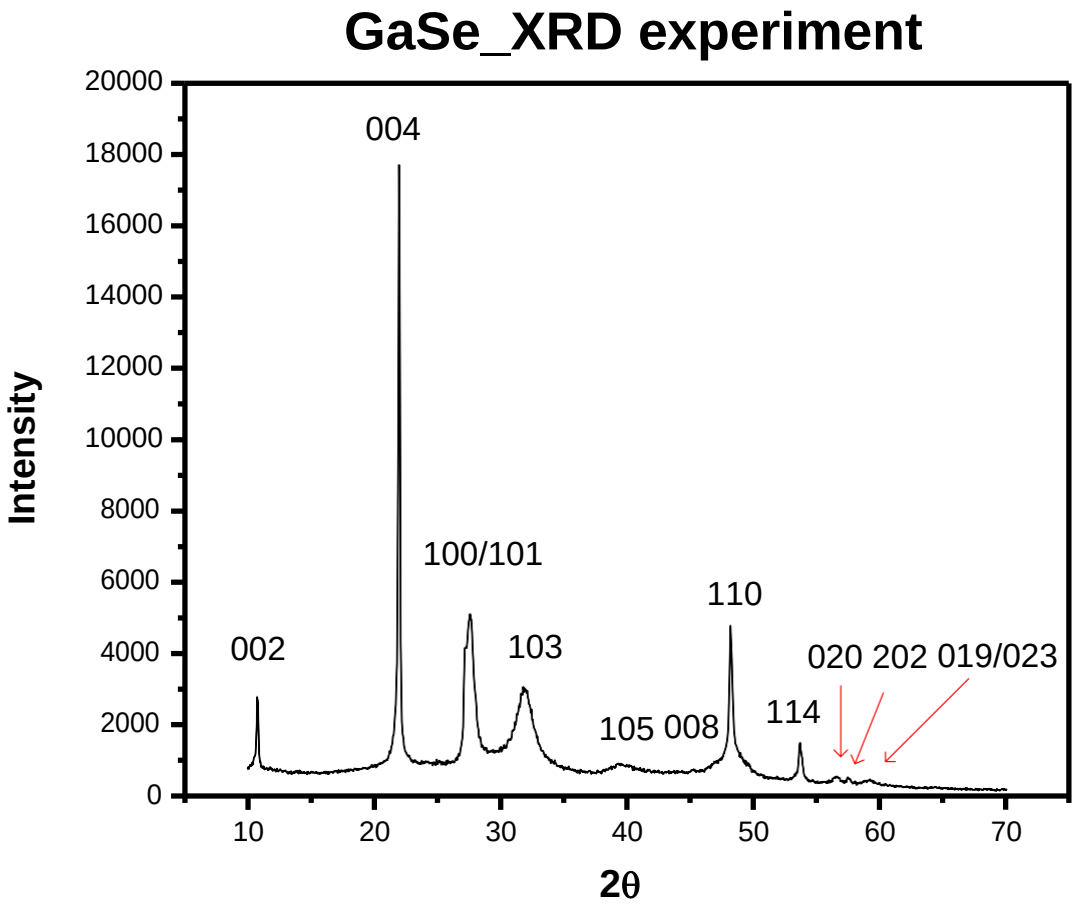

Fig. S1. (a) Powder X-ray diffraction (XRD) pattern of GaSe as-grown crystal. The powered sample was prepared by finely ground some small crystals of layered GaSe together with quartz powder for grinding. The peak pattern of XRD reveals preferred orientation of the *c* plane [e.g. (002)≈10.85° and prominent (004)≈22°] to show its two-layer hexagonal (2H) stacking structure. The lattice constants of the 2H GaSe can be calculated using hexagonal system equation [23], and which are determined to be *a*=3.75 Å and *c*=15.94 Å , respectively.

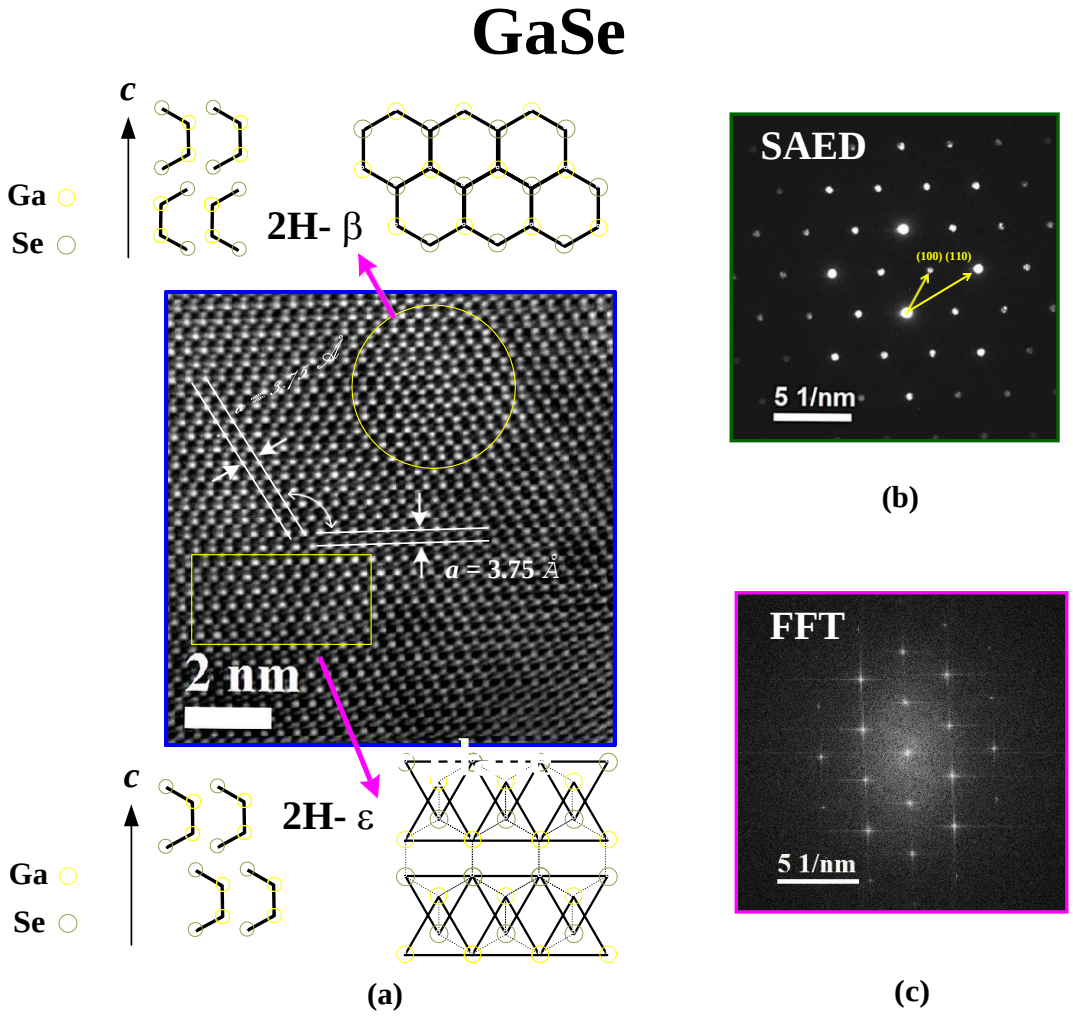

Fig. S2. (a). High-resolution transmission electron microscope (HRTEM) image of the as-grown GaSe few layer. The zone axis is along <001> with electron beam impinged on the *c* plane. From the scale of the HRTEM image, the *a* axis is estimated to be 3.75 Å that matches well with the XRD result. The yellow circle and yellow rectangle respectively show the GaSe may contain two different atomic-stacking arrangements. The top part (circle) may be 2H-β stacking phase with the representative scheme shown in upper inset. The lower part (yellow rectangle) shows slightly different atomic arrangement as compared to the upper part. It is maybe coming from the 2H-ε stacking phase. For ε stacking phase, the Se-Ga-Ga-Se units in the two monolayers' stacking are shifted and misaligned along *c* axis for forming the symmetry of D^{1}_{3h}. The ε-GaSe possesses lower bandgap than that of β-GaSe. (b) Selection-area-electron-diffraction (SAED) pattern of GaSe. The dotted spots reveal high crystalline quality and the lattice spacing (100) can be determined to be *a*=3.75 Å . (c) Fast-Fourier-Transform (FFT) dotted pattern for the HRTEM measurement.

The result identifies the lattice structure and crystalline quality of the as-grown GaSe.

Supplementary Information Reference:

23. L.V. Aza’ roff, M. J. Buerger, “The Powder Method in X-ray Crystallography,” McGraw-Hill, New York, 1958.