Electronic Supplementary Material (ESI) for Nanoscale.

Ultrafast carrier dynamics of conformally grown semi-polar ($11\bar{2}2$) GaN/InGaN multiple quantum well co-axial nanowires on m-plane GaN core nanowires

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S1. Temporal decay curves (TDCs) at low and room temperature

Fig. S1 shows time decay curves measured at 18 K and 300 K for all samples. It can be observed from the Fig. S1(a) that the decay profile of sample (A) is slower which exhibits long lifetime of carriers at 18 K. Moreover, Fig. S1(b) shows TDCs of all samples measured at 300 K while sample (A) and (E) shows longer lifetime.

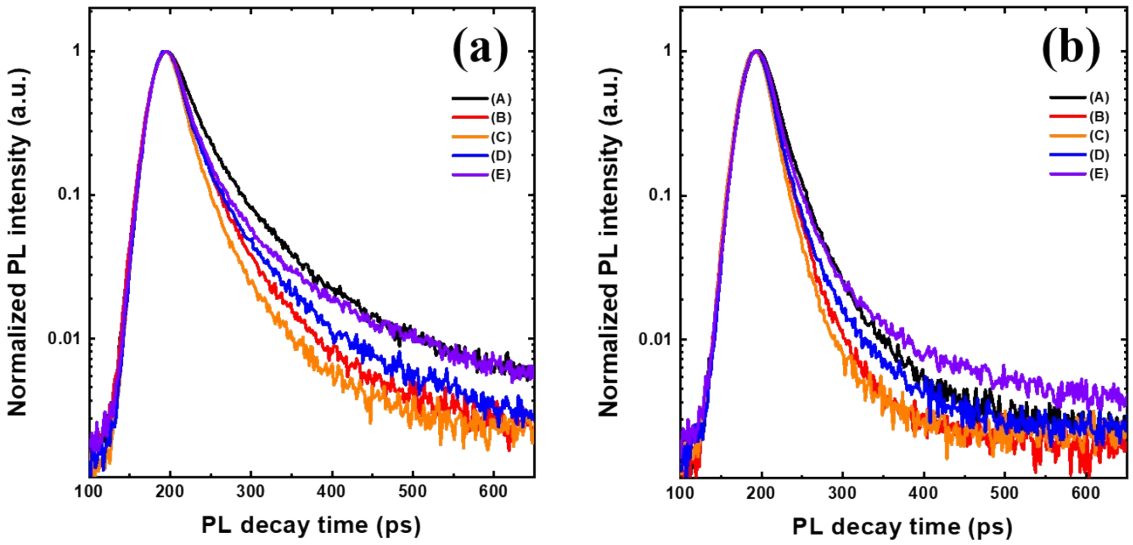

Fig. S1 TDCs measured for all samples at (a) 18 K and (b) 300 K

S2. Temporal decay maps of Sample (A)

Fig. S2 shows temperature dependent temporal decay maps of sample (A). Sample (A) also shows the similar behavior as other samples with thickness of InGaN QW. The only difference is the peak broadening which is higher for sample (E).

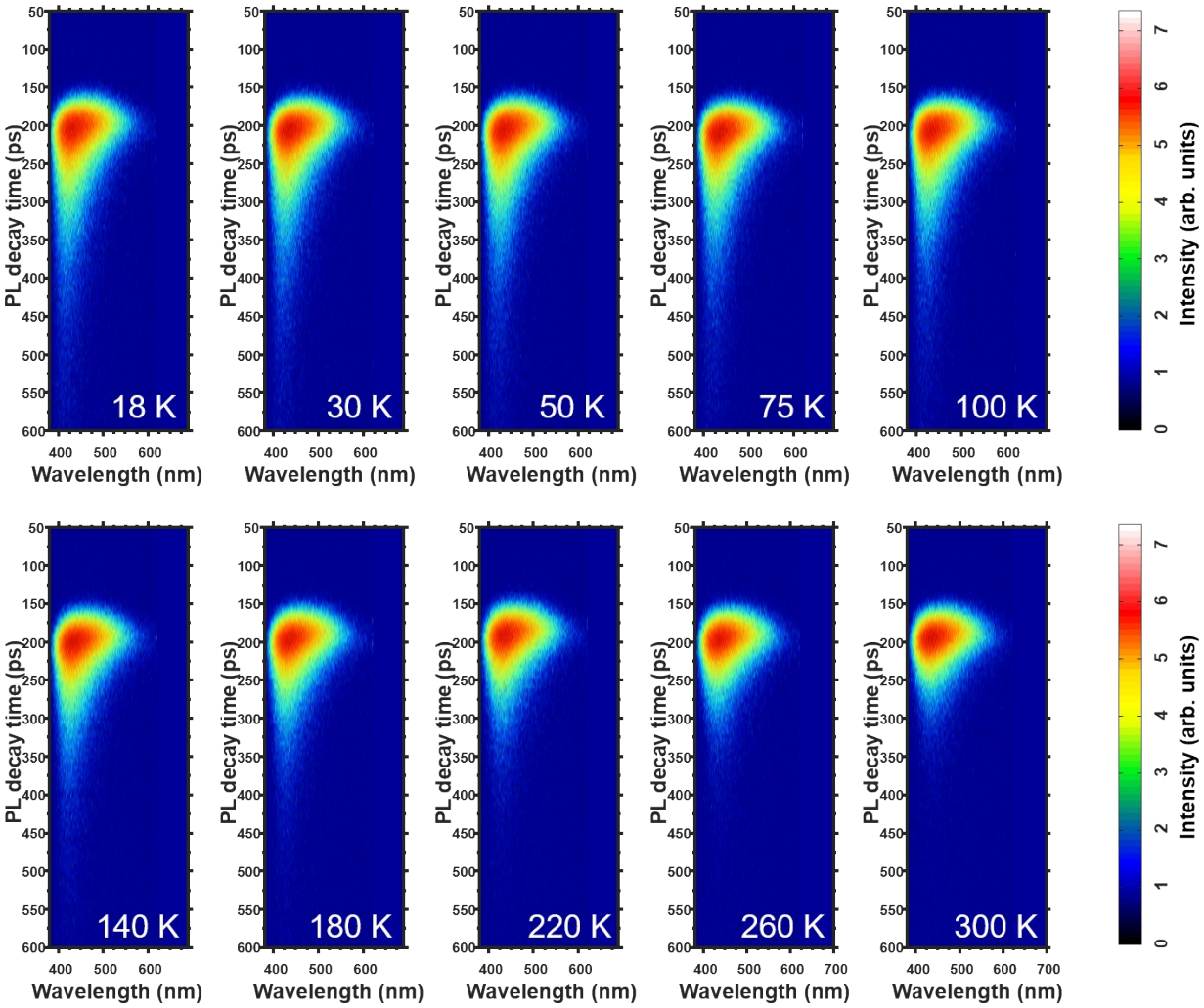

Fig. S2 Temperature dependent temporal decay maps of sample (A)

S3. Temporal decay maps of Sample (B)

The temperature dependent temporal decay maps of sample (B) are shown in Fig. S3. The sample was measured at several temperatures from 18 K to 300 K. The tail of decay map shows the extended decay time. The tail is prominent from 18 K to 140 K and then the intensity of tail starts to decrease due to the thermal escape from strongly localized states.

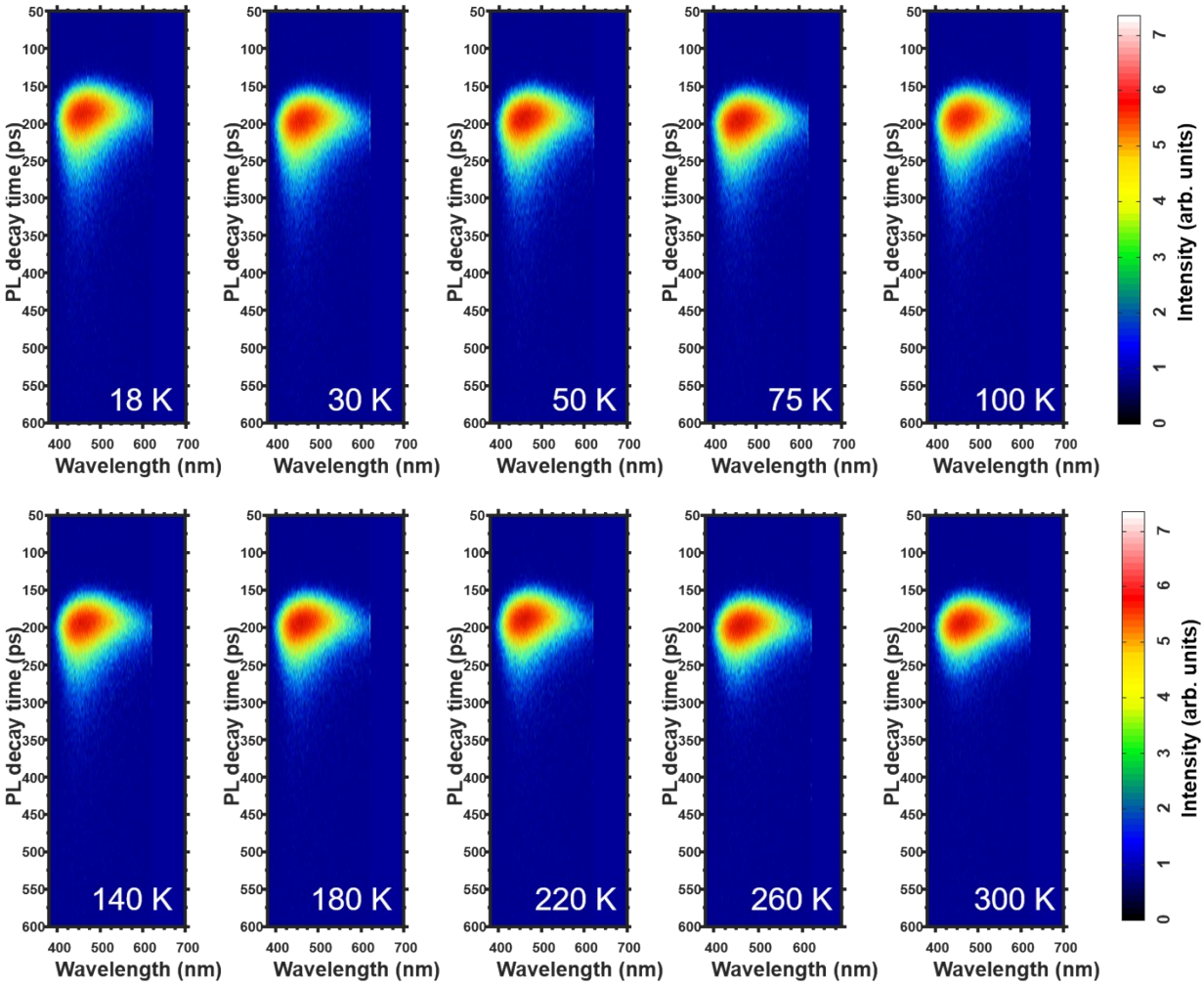

Fig. S3. Temperature dependent temporal decay maps of sample (B).

S4. Temporal decay maps of Sample (C)

The temperature dependent temporal decay maps of sample (C) are shown in Fig. S4. The relative intensity of tail is lower than the relative intensity of tail of sample (B). Moreover, overall intensity of tail decreases from 140 K to 300 K.

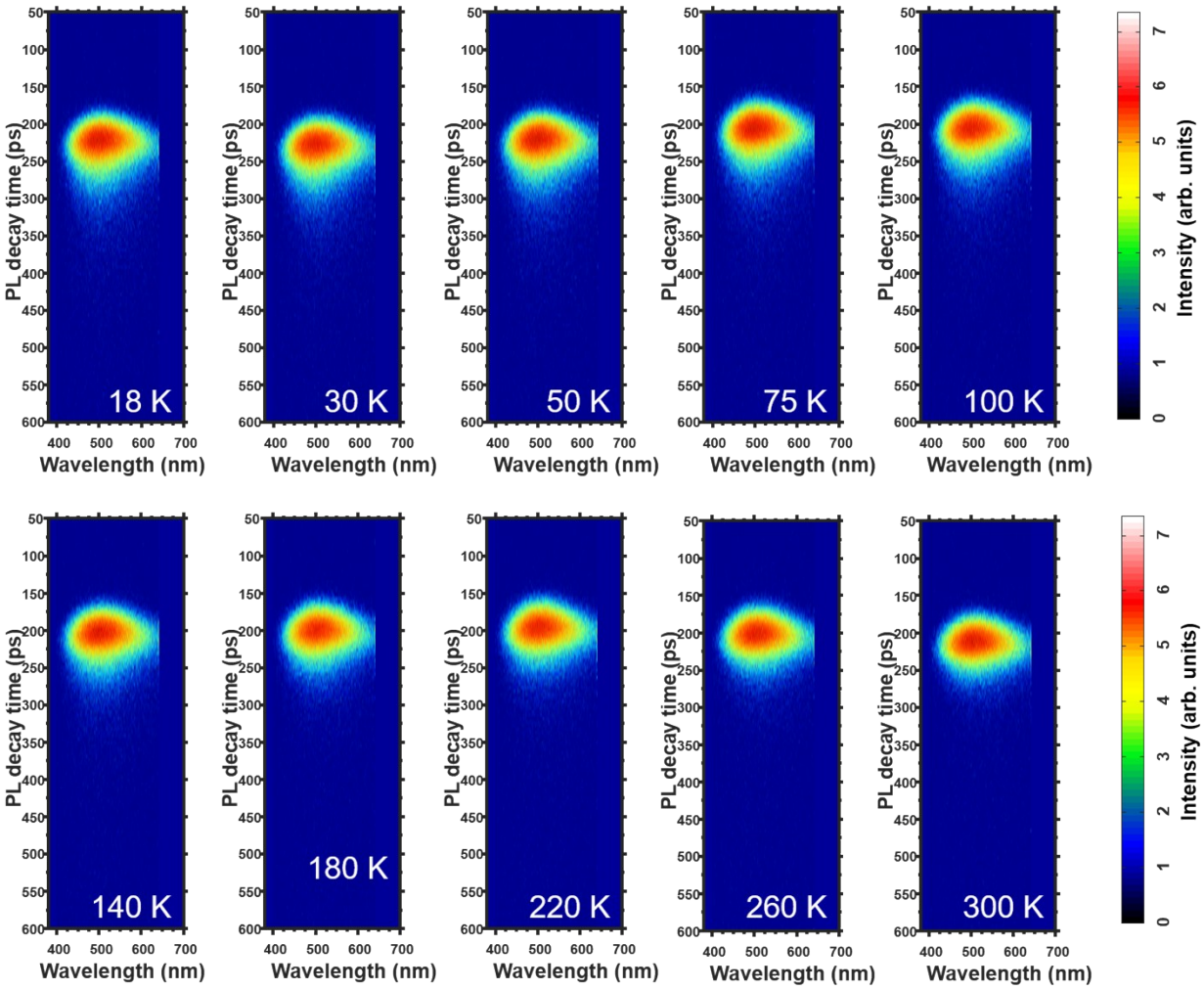

Fig. S4 Temperature dependent temporal decay maps of sample (C)

S5. Temporal decay maps of Sample (D)

The temperature dependent temporal decay maps of sample (D) are shown in Fig. S5. The decay tail at 18 K is very prominent and it is on higher wavelength then the emission peak. The tail exhibits the similar emission intensity upto 140 K and then the emission intensity starts to decrease due to thermal escape of carriers from strongly localized states.

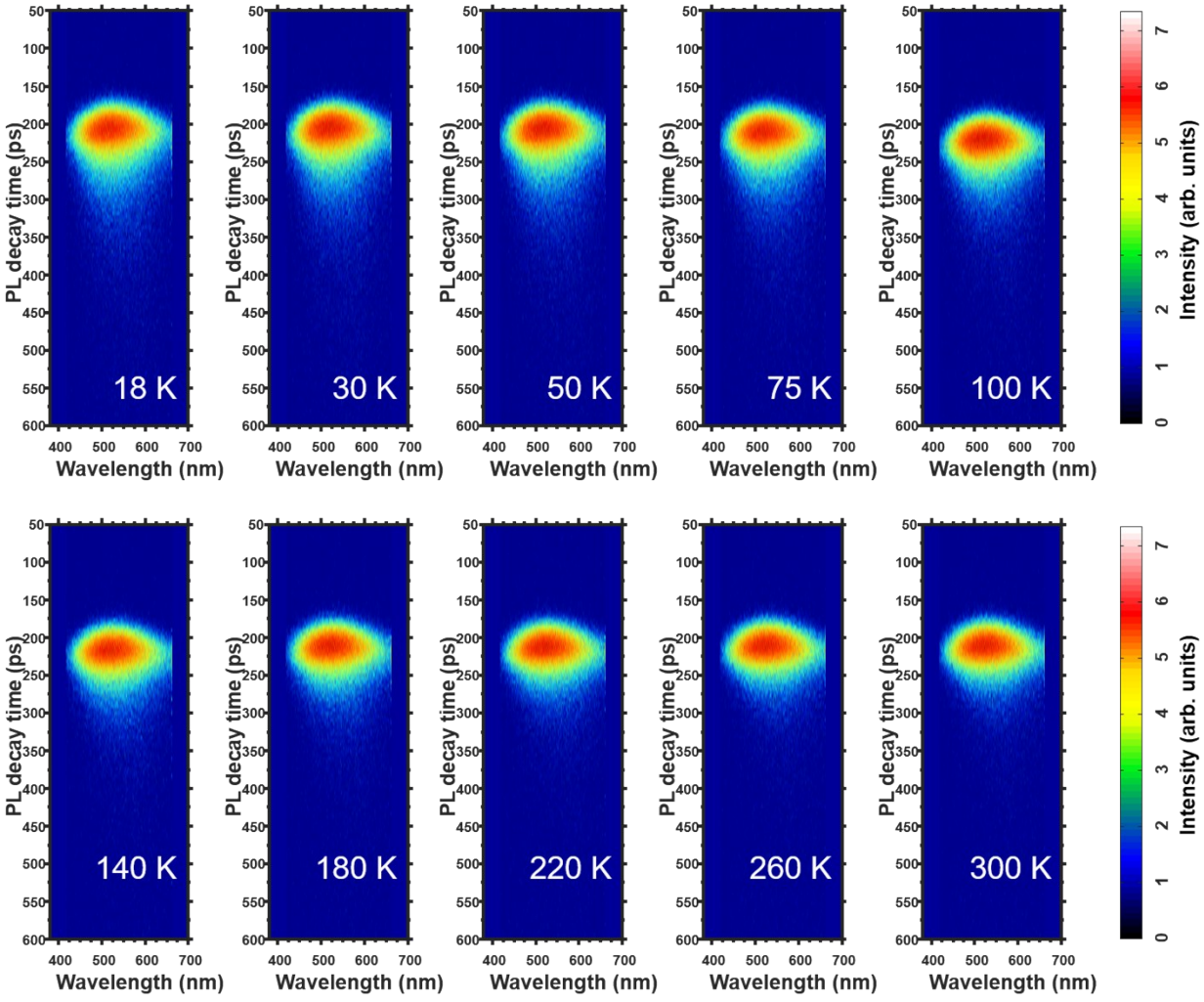

Fig. S5 Temperature dependent temporal decay maps of sample (D)

S6. Change in intensity as a function of emission wavelength

In order to demonstrate the emission intensity as function of emission wavelength, Fig. S6 is added here.

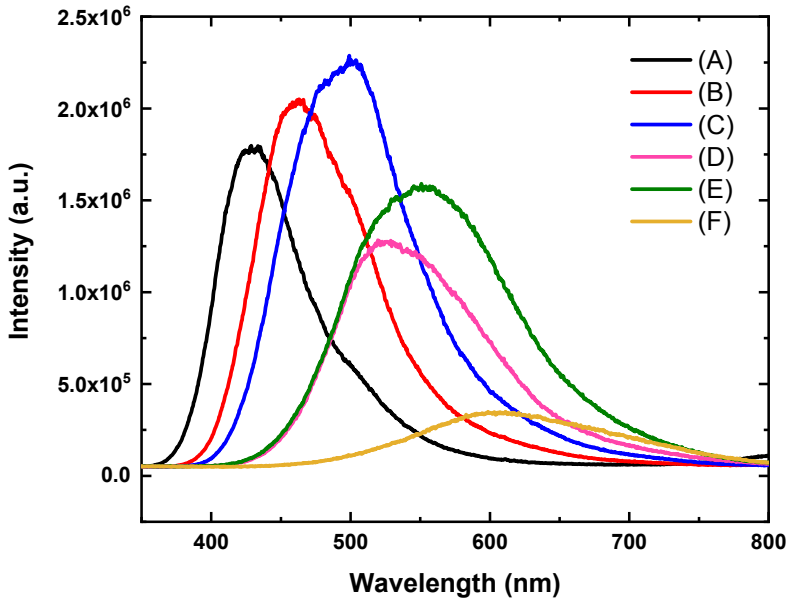

Fig. S6 Change in intensity as a function of emission wavelength