

Observation of anisotropic growth and compositional discontinuity in AlGa_N electron-blocking layers on Ga_N micro-rods

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Author Contribution

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(nm)

	m1-plane	m2-plane	m3-plane	m4-plane	m5-plane	m6-plane	Average	Standard Deviation	Coefficient of Variation
Buffer	165.1	170.0	164.5	154.4	147.6	153.2	159.1	7.89	0.0495
1st Qb	16.8	18.0	17.0	14.4	14.8	14.8	16.0	1.35	0.0844
2nd Qb	15.8	16.2	15.3	13.9	13.9	14.8	15.0	0.86	0.0576
3rd Qb	14.8	16.2	14.4	13.5	13.9	13.9	14.4	0.88	0.0607
4th Qb	31.4	37.7	36.0	36.8	25.2	36.9	34.0	4.45	0.1309
1st Qw	7.2	7.2	7.6	7.2	7.2	7.1	7.3	0.18	0.0243
2nd Qw	6.5	6.3	6.7	6.7	6.7	6.7	6.6	0.18	0.0269
3rd Qw	6.1	6.3	6.3	6.3	6.3	6.3	6.3	0.07	0.0113
4th Qw	6.1	5.8	5.8	5.8	5.8	5.8	5.9	0.10	0.0166
EBL	47.6	51.2	47.2	22.4	9.0	48.1	37.6	15.99	0.4257
p-GaN	202.8	213.1	189.8	214.2	211.4	186.1	202.9	11.24	0.0554
Total	520.2	547.9	510.6	495.6	461.9	493.8	505.0	26.39	5.23

Table. S1. Thickness of each layer on every six m-planes of the micro-rod. Note that EBLs show highest standard deviation (11.99) and coefficient of variation values (0.4257) compared with other layers, indicating their asymmetric growths.

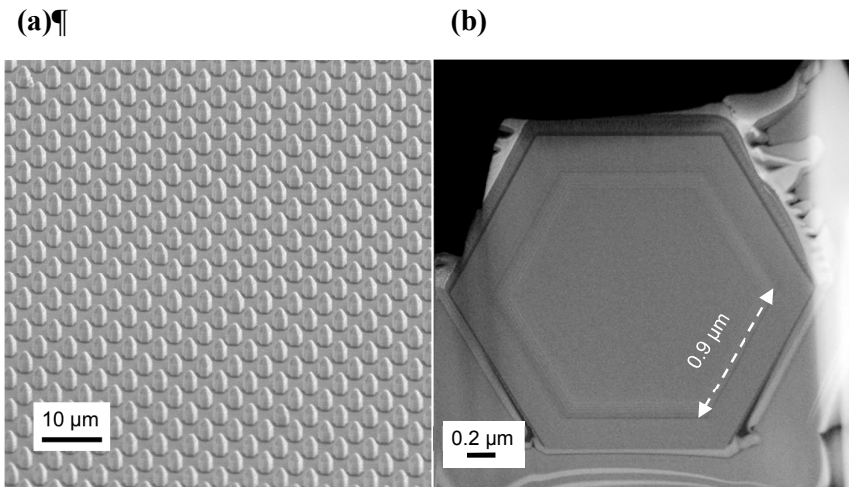


Figure. S1. (a) SEM image of GaN micro-rod LEDs array and (b) cross sectional HAADF-STEM image of the GaN core-shell micro-rod. The length of m-plane ranges in between 0.7 and 1 μm .

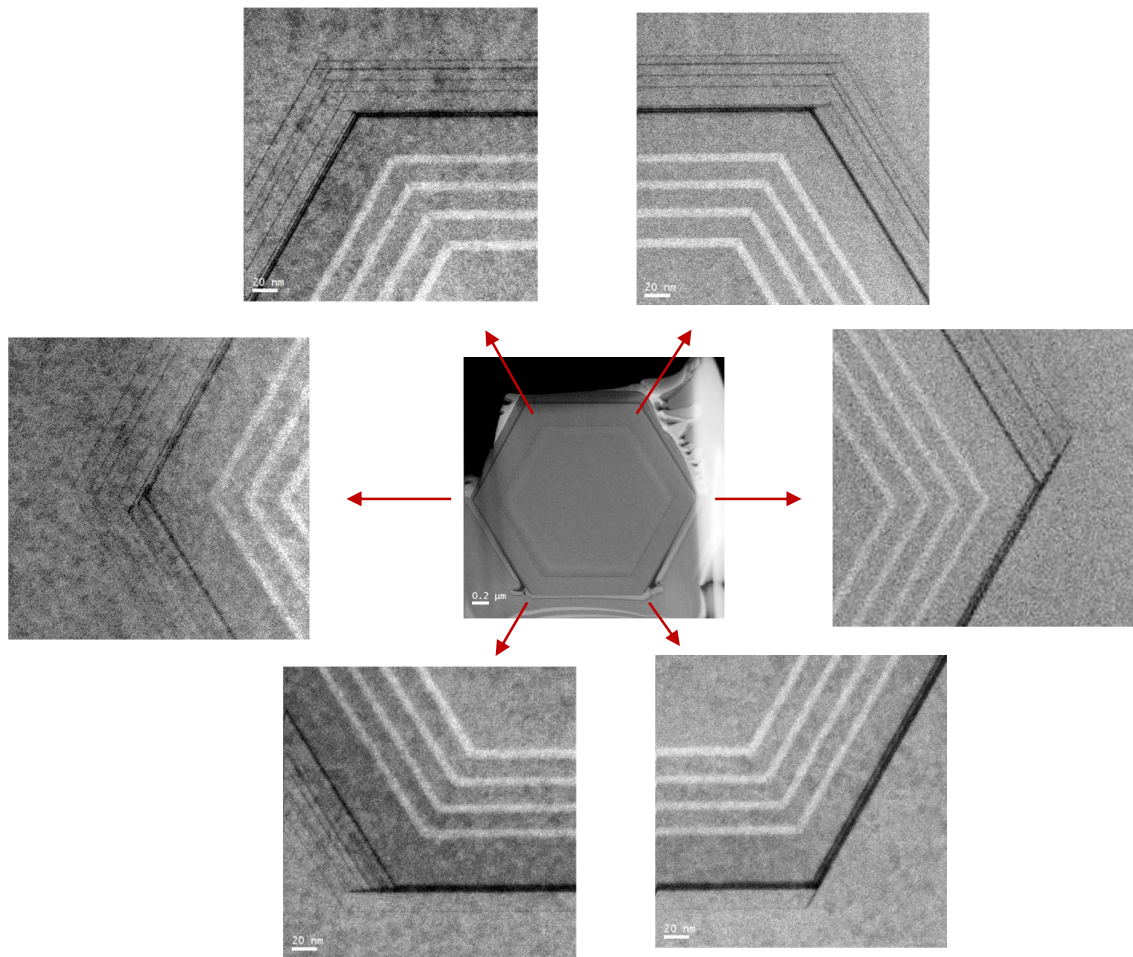


Figure. S2. Cross section HAADF-STEM images acquired at six different m-plane corners of a single micro-rod. The images show the phase-separated AlGaIn EBLs that have different thicknesses and lengths on the six m-planes of the GaN micro rod.