Supporting information

Enhancing light coupling and emission efficiencies of AlGaN thin film and AlGaN/GaN Multiple Quantum Wells with periodicity-wavelength matched nanostructure array

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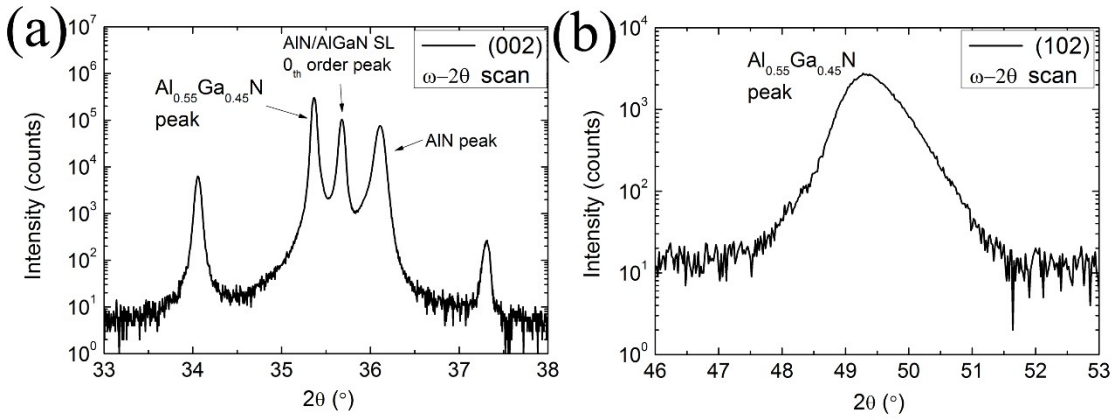

Figure S1, HRXRD symmetric (002) scan (a) and asymmetric (102) scan (b) of $Al_{0.55}Ga_{0.45}N$ thin film grown on AlN/sapphire substrate, where Al content x_{Al}=0.54 was achieved by calculation of lattice parameters of AlGaN

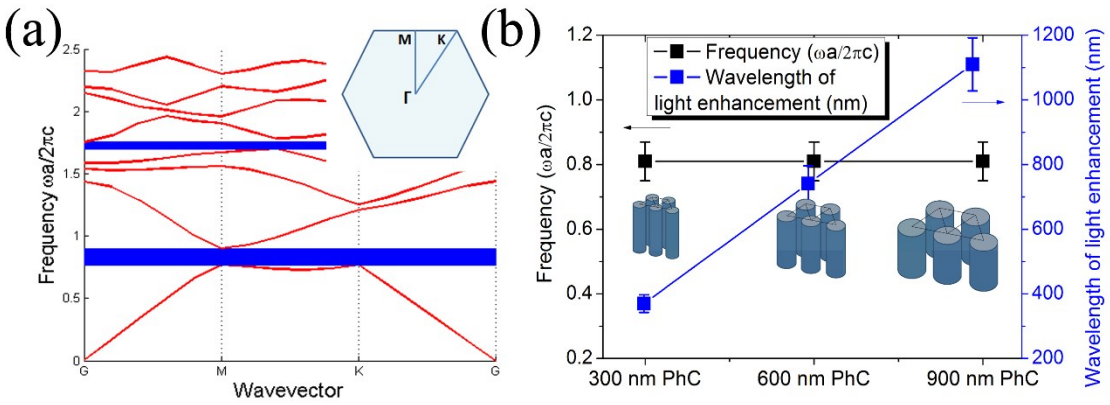

Figure S2, Band structure of 2D AlGaN PhC with periodicity of 300 nm (a). Inset images illustrates high symmetric points inside a hexagon-shape unit cell. Normalized frequencies and wavelength of light enhancement as a function of PhC periodicity (b)

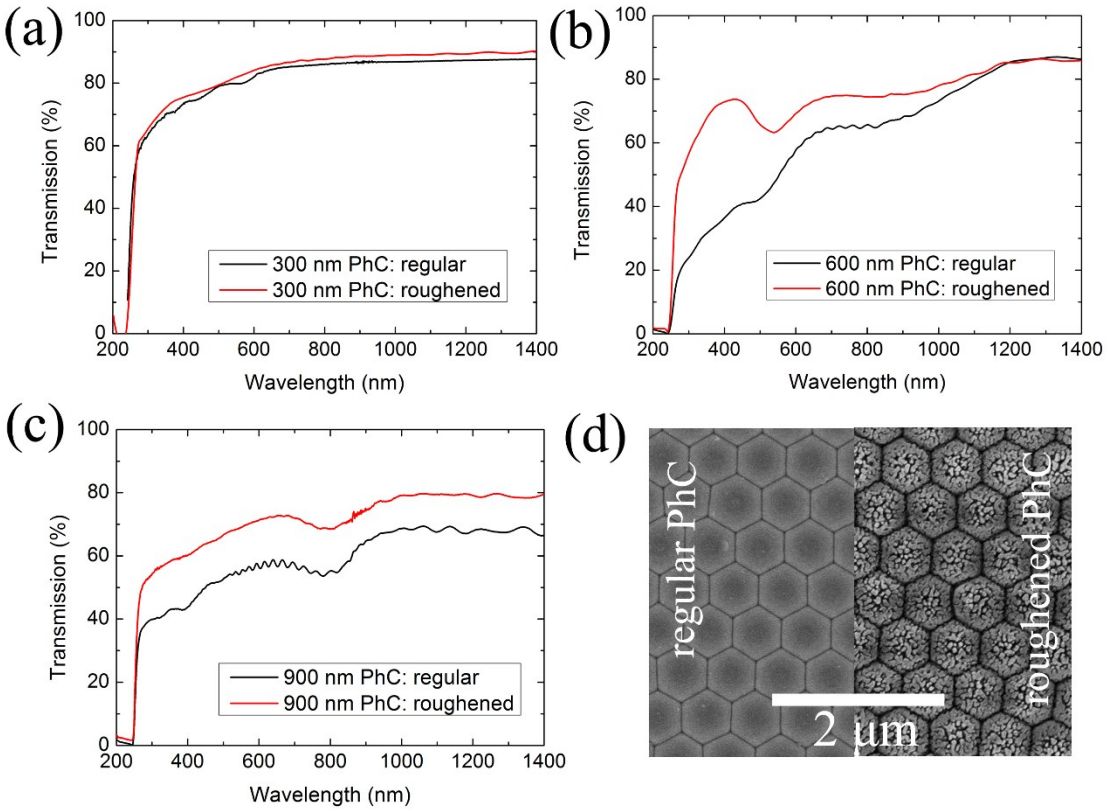

Figure S3, Light transmission of 300 nm PhC (a), 600 nm PhC (b) and 900 nm PhC (c) patterned AlGaN with and without sub-wavelength scale nano-roughening on top; Top-view SEM images of 600 nm periodicity regular PhC and roughened PhC patterned AlGaN (d)