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Study on optical properties of Superluminescent diode with different etching depth

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Superluminescent diodes (SLDs) with high power and broaden spectral bandwidth features were essential to apply optoelectronic systems such as optical coherence tomography, optical time-domain reflectometers, and fiber-optic gyroscope. To recently apply these fields, Quantum-Dot (QD) based SLDs are standing out as a light source because QD based optical devices have superior characteristics with respect to higher optical gain, lower threshold current and temperature sensitivity, and narrower spectral linewidth than QW based optical devices. Until now, these characteristics have plentifully researched. However, Far-field radiation pattern, one of the output beam qualities of SLD, is not as discussion as the characteristics mentioned above, because the far-field radiation pattern of SLDs has a rather complicated form due to the tilted or bent waveguide structure. In addition, the far-field radiation pattern determines the angular divergence from fraunhofer-diffraction approximation if the propagation distance of diffraction light emitted from one tilted end facet of SLD is large enough. In this work, we fabricate InAs/InGaAs five-stacked QD SLDs with different etching depth on same wafer by wet-etching, measure their optical properties, and present the far-field radiation pattern.