Selective-area-growth of InAs-QDs for PC-based all optical devices

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A metal mask (MM) method combined with MBE for selective-area-growth (SAG) of InAs quantum dots (QDs) was developed for realizing photonic crystal (PC)-based all optical switch: PC-SMZ [1]. Figure 1 shows the MM available for the QD patterning in the PC-SMZ. The successful SAG of QDs with high density (4 x 10^{10}cm^{-2}) and high uniformity was confirmed by AFM observations and PL measurements, as shown in Fig. 2. QDs embedded into the GaAs PC slab in this way play the key role of optical nonlinear media in the PC-SMZ.

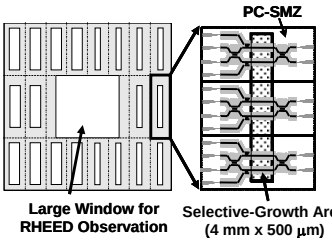

Fig.1 MM for selective area growth of QDs for PC-SMZ.

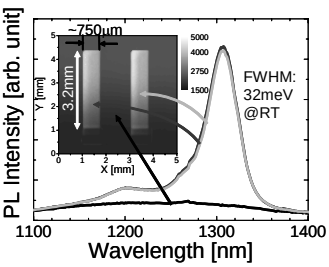

Fig.2 PL spectra and intensity mapping of QDs grown by the MM.

[1] K. Asakawa, *et al*., *New J. Phys* **8,** 208 (2006).