CHAPTER V

CONCLUSIONS

Multi-cycles of thin-capping-and-regrowth technique was applied to extend nanopropeller blade elongated along $[1\bar{1}0]$ crystallographic direction. The thin-capping thickness of 9 ML yielded longest nanopropeller and good uniformity for every number of cycles of thin-capping-and-regrowth in this experiment, i.e. 1, 3, 5, 7 cycles. Nanopropeller templates are used for overgrowth of InAs QDs. Nanopropellers with difference length require difference final-cycle regrowth thickness in to fulfil QDs on nanopropeller blades. Only 1.2 ML is sufficient for 300 nm nanopropeller from 1 cycle with 9 ML thin-capping thickness while 700 nm nanopropeller from 1 cycle with 9 ML thin-capping thickness need 1.6 ML of regrowth thickness. Too high overgrowth thickness leads to increasing of number of QD forming outside template. Consequently, alignment of QDs are lost.

QDMs consist of two difference sizes of QDs. Large one is called centre QD which locate at the centre of nanopropeller and QDMs. Smaller one is satellite QDs which is locate on nanopropeller blade. PL peaks of long chain QDMs emit higher photon energy than small-group QDMs due to higher density ratio of small-size QDs of satellite QDs to large-size QDs of centre QDs.

Long chain of QDMs shows the polarization dependence of PL spectra while as-grown QDs and 1-cycle QDMs was not observed. QDMs from longer nanopropeller templates give higher anisotropy of optical property. However, high QDs density of QDMs limit anisotropic alignment of QDs because it have greater number of QDs coupling in [110] direction. This results in limitation of optical anisotropy. By starting from lower density of as-grown QDs, long chain QDMs can yield the degree of polarization dependence up to 63%.