

## Spin LED structures

An overview of a spin LED structure is presented in Fig. 1, where the ZnMnSe spin aligning layer with low Mn concentration and InGaAs QDs embedded in GaAs are shown in an overview cross-section TEM image.

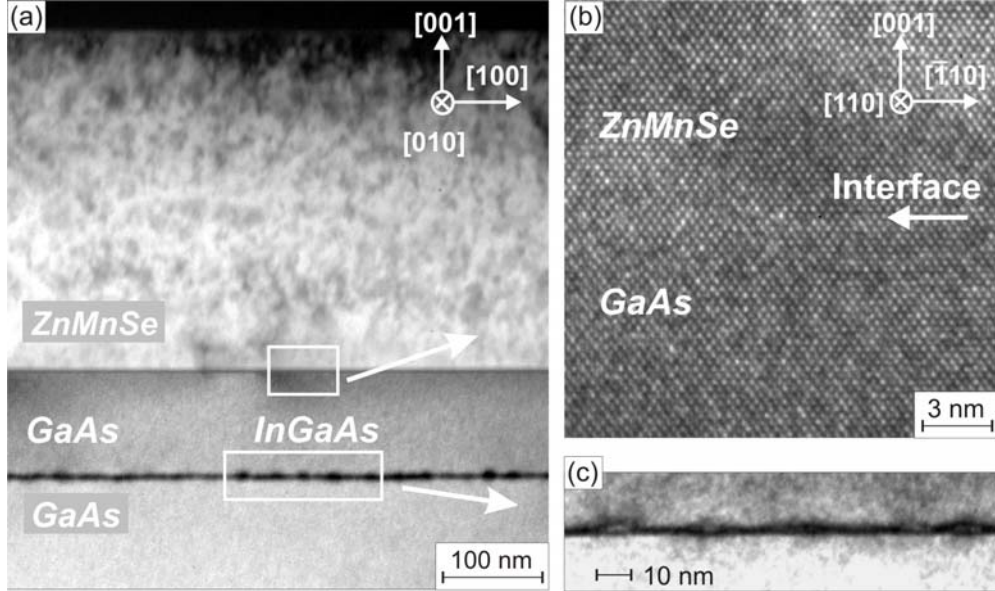


Fig. 1: Cross-section images of a spin LED structure. (a) and (c) (002) dark-field images close to [010]-zone axis, (b) HRTEM image of ZnMnSe/GaAs interface close to [110]-zone axis

Fig. 1 demonstrates that the spin-aligning ZnMnSe layer is free of defects over a large region in the  $\mu\text{m}$  range which is an indispensable prerequisite for obtaining a high spin-polarization degree. After optimizing the properties of ZnMnSe spin aligners and GaAs spacer thickness, another critical factor is morphology of the InGaAs QDs. HRTEM combined with CELFA shows that lower spin polarization degrees are correlated with samples containing large QDs as shown in Fig. 2a. In contrast, embedded QDs with an In-distribution displayed in Fig. 2b often show spin polarization degrees up to 100 %.

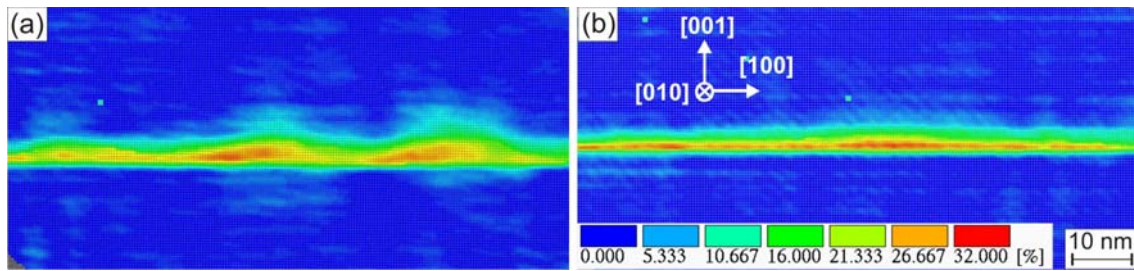


Fig. 2: Evaluated In-distribution on the basis of high-resolution cross-section TEM images of InGaAs QDs contained in a structure with (a) low spin-polarization and (b) high spin polarization.

## References

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