

## THE EFFECTS OF POLARIZATION FIELDS ON EXCITON BINDING ENERGY IN GaN QUANTUM DOT

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It is well-known that the wurtzite GaN and  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  have a strong spontaneous macroscopic polarization and remarkable piezoelectric polarization [1]. The exciton binding energy is investigated by considering influences of polarization in details. We find that the strong built-in electric field gives rise to an obvious modification of conduction band profile of QDs and leads to remarkable electron-hole spatial separation. This effect has a significant influence on exciton states and optical properties of the QDs. The relationship between exciton states and height of QDs is studied. Our results represent the decrease of exciton binding energy by considering piezoelectric polarization [2,3].

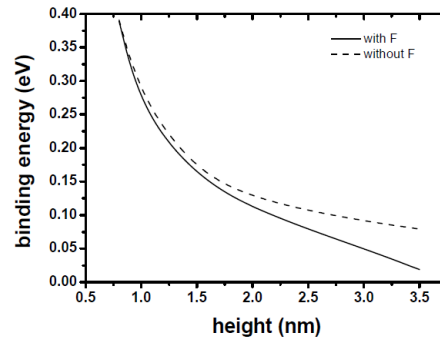


Fig. 1 .comparison of exciton binding energy by considering polarization and without it for cylindrical QD with radius  $R=4\text{nm}$  and  $x=0.12$ .

### References

- [1] A. Asgari, M. Kalafi, L. Faraone, "The effects of partially occupied sub-bands on two-dimensional electron mobility in  $\text{Al}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  heterostructures" J. Appl. Phys. **95**, 1185 (2004).
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