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In-situ HRTEM investigation of GaAsBi/GaAs structure transformation during high-temperature annealing

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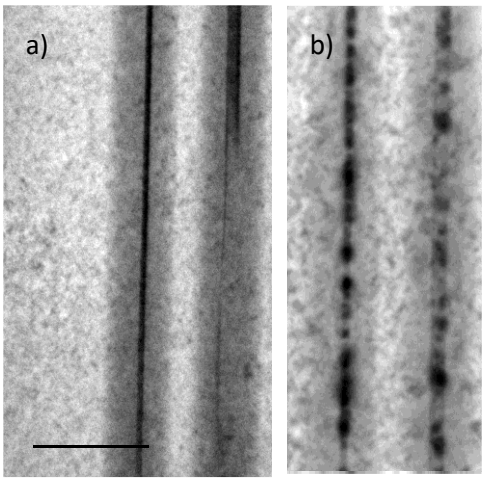
$GaAs_{1-x}Bi_x$ -based heterostructures have a large potential for optoelectronic applications in a wide spectral range extending from the near- to mid-infrared region. Substitution of As by Bi in GaAs lattice produces a much larger reduction in the band gap (-60 to -80 meV/%Bi) than alloying by In of Sn thus making this material attractive for infrared radiation emitters and detectors [1]. Despite high potential, bismide compounds were only scarcely investigated, especially regarding internal structure of sample transformation during annealing and formation of Bi quantum dots.

Fig. 1 in-situ HRTEM micrographs of GaAsBi/GaAs sample at a) RT and b) 550 ^{o}C



In this work, MBE grown complex GaAsBi/GaAs structure, that also included GaAs-AlAs parabolic quantum wells were in-situ annealed and investigated by High-resolution Transmission electron microscopy. During annealing Bi quantum dots were formed in GaAsBi layers, while sample transformations occurred in much lower temperatures that for bulk sample, indicating different annealing environment in both approaches. Figure 1 represents sample in RT and also at elevated temperatures (300 ^{o}C and 550 ^{o}C).

REFERENCES

[1] R. Butkutė, G. Niaura, E. Pozingytė, B. Čechavičius, A. Selskis, M. Skapas, V. Karpus, A. Krotkus. Nanoscale Res. Lett. 2017, 12, 436.