

# Atomic Layer Deposition of BN based on polymer derived ceramics route: fabrication of functional complex nano-/hetero-structure

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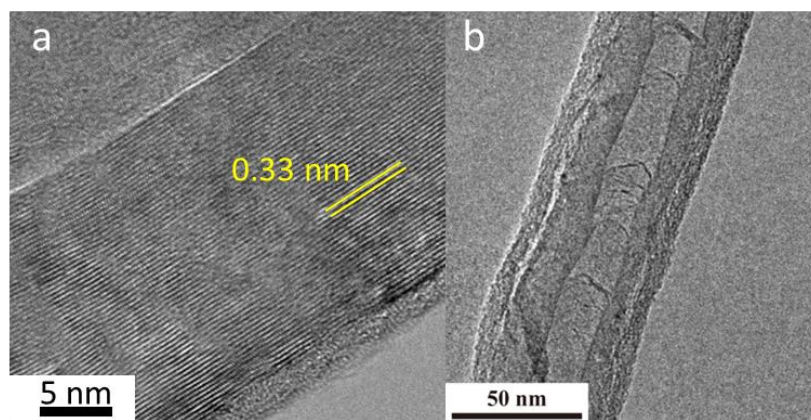
Renewal clean energy and environment are two of the most important concerns for the coming decades. Fewly investigated, hexagonal BN nanostructures are very attractive materials with various applications such as in environmental domain.[1] ALD technique is an effective approach for surface modification and fabrication of complex nanostructured materials.[2] However, few ALD processes of BN were reported so far and they are mostly based on ammonia and/or halide precursors and no high crystalline quality was yet achieved.[3] Based on polymer derived ceramic (PDCs) chemistry, we developed a low temperature ALD process of BN, that permits access to various h-BN complex nano- and hetero-structures.[4-5]

Herein, we report the fabrication of h-BN complex nano-/hetero-structures by a novel two-step ALD approach using trichloroborazine and hexamethyldisilazane. This two-step process consists of the growth layer by layer of a preceramic BN films, onto various substrates, at low temperature, and then to its densification into pure h-BN by annealing process. h-BN thin films were successfully deposited on various substrates/templates, such as carbon nanotubes, polyacrylonitrile fibers, and etc. In particular, h-BN coating of carbon nanotubes (Figure 1b) and fabrication of BN nanotubes (Figure 1a) using ALD will be introduced. The obtained BN materials are characterized by advanced electron microscopy and related techniques.

## References

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## Figures



**Figure 1:** TEM images of a) a h-BN nanotubes and b) a BN coated carbon nanotubes both fabricated using ALD.