Variational model for synthesizing boron nitride nanomaterials

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Abstract. Many structures of boron nitride nanomaterials have been found experimentally, such as BN nanocones and BN fullerenes. These structures have received considerable attention because of their physical, chemical and electronic properties. Joining these nanostructures give rise to new structures with remarkable properties and new applications for design of probes for scanning tunnelling microscopy.

This paper uses calculus of variations to model the join between two types of boron nitride(BN) nanostructures. In particular, BN nanocones and BN fullerenes. The joining scenarios are categorised into two models based on the joining curvatures. Specifically, Model I refers when the join configuration only includes positive curvature where Model II is considered for both positive and negative curvatures. This model provides a general framework to join boron nitride nanostructures.