The title (العنوان):

The influence of hole networks on the adsorption-induced frequency shift of a perforated nanobeam using non-local elasticity theory

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Abstract: Modelling the non-local frequency shift caused by the adsorption phenomenon of an adatom-perforated nanobeam system taking into account the influence of shear distortion as well as small-scale behavior has been proposed in this paper. The nanobeam structure is a one-dimensional system perforated with a network of periodic square holes. The small-scale behavior was modeled using the elasticity theory of Eringen, while the explicit shear force and bending moment were determined from the standard dynamic equations. Adatom-adatom energy and adatom-substrate energy were introduced using the van der Waals (vdW) interactions in the framework of Lennard-Jones (6–12) potential to determine the total shift in energy. Both the shear beam model (SBM) and Euler beam model (EBM) were derived in this work by modifying the system coupled equations. The frequency shift for the *H/Au(100)* system was calculated, which showed that its observed value depends on the size and number of holes as well as the mode number and adsorption density. These results have been interpreted in detail toward the appropriate design of mass detection devices.

Key words: The influence ; Hole networks ; Adsorption-induced frequency ; Nanobeam using Non-local elasticity theory