

# Simulation Of Nanoindentation Tests Of Various DLC Based Coating Systems

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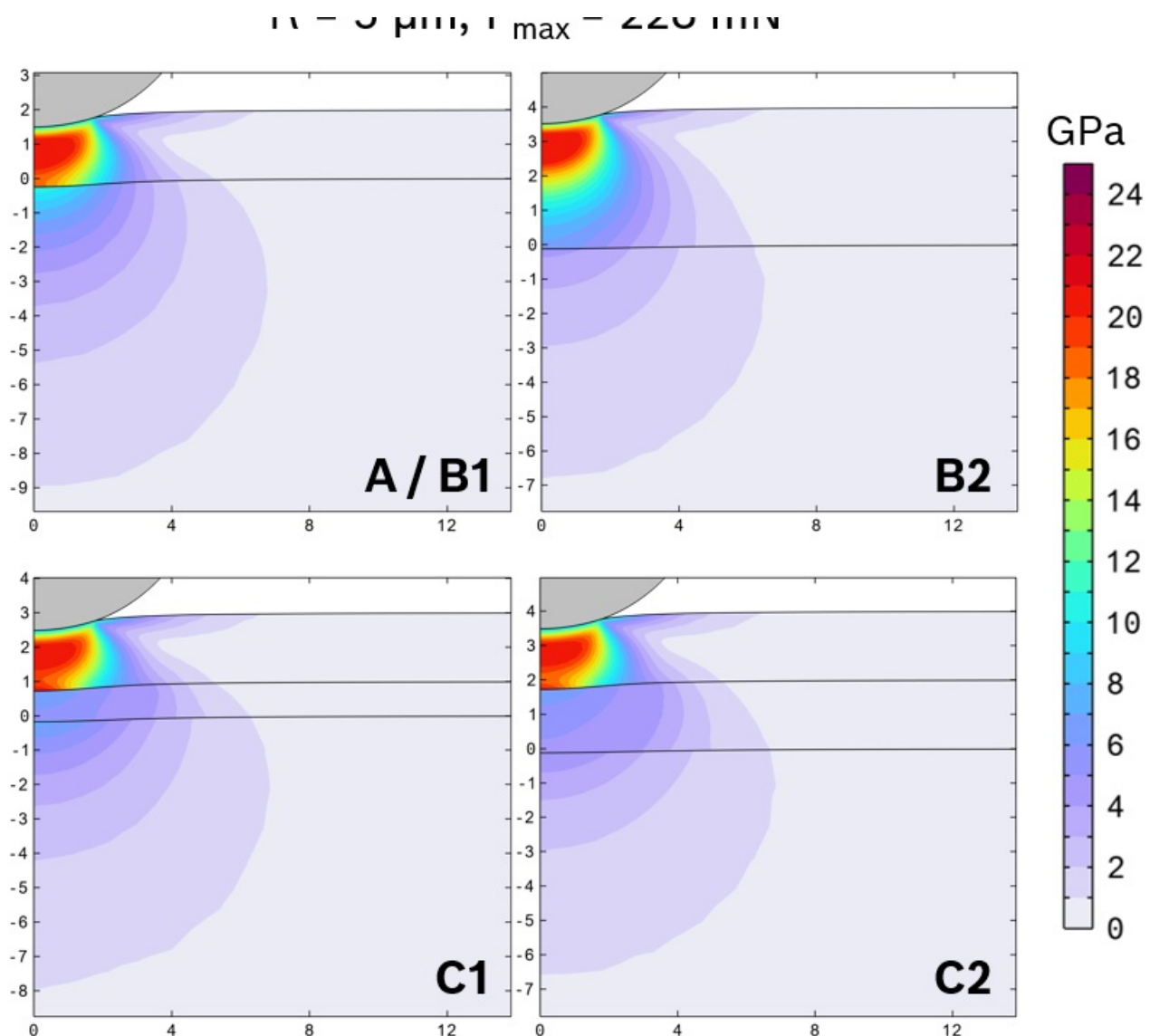
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## Abstract

Diamond-like carbon (DLC) coatings have attracted much attention due to their exceptional hardness, low coefficient of friction and excellent wear resistance. These coatings are used in numerous industrial applications ranging from automotive and aerospace to biomedical and electronic applications.

In order to tailor the coatings for the appropriate application, an understanding of the mechanical properties, behaviour under the applied load spectrum and stress distribution in the coating are crucial. Especially the mechanical properties can affect the fatigue behaviour and therefore the lifetime of the coated products so that an optimization is inevitable. This is done by carrying out a large number of tests and the corresponding mechanical characterization by means of nanoindentation. To accelerate this optimization process and to get a better understanding of the experimental stress distribution within the thin films, nanoindentation simulations are performed. It will be shown how different coating designs influence the stress distribution in the layer-substrate composite and how the induced substrate stresses are reduced. This model is the basis for a novel simulation of the cyclic fatigue behaviour of DLC coating systems.

## Figures used in the abstract



**Figure 1** : Stress distribution of different DLC coating designs

