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Title: Achieving ultra-hard surface of mechanically polished diamond crystal by thermo-chemical refinement

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Highlights

- 1) A novel thermo-chemical post-processing method is proposed to refine the mechanically polished surface of diamond crystal.
- 2) Diamond surface with sharp enhancement in hardness and Young's modulus can be achieved.
- 3) Formation of graphene on the topmost surface of refined diamond crystal is responsible for the ultra-hard property.

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