

RESEARCH ARTICLE

Overcoming Debye length limitations: Three-dimensional wrinkled graphene field-effect transistor for ultra-sensitive adenosine triphosphate detection

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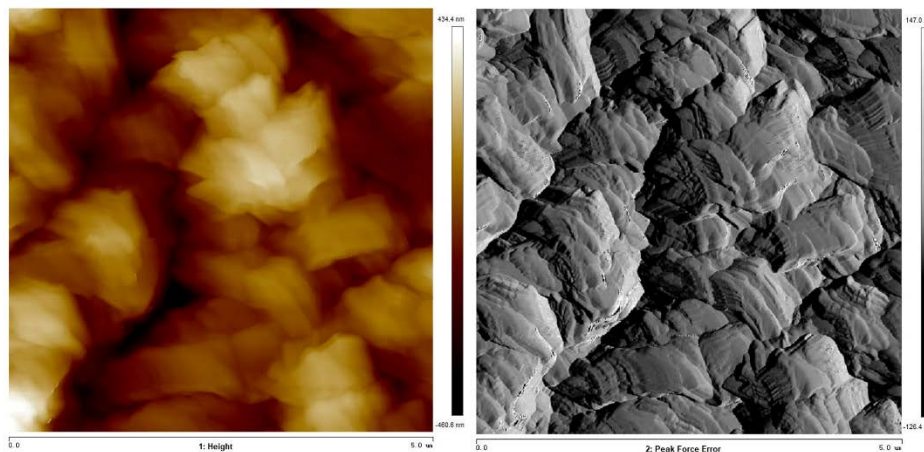
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Supporting Information



$R_a = 118 \text{ nm}$

$R_q = 142 \text{ nm}$

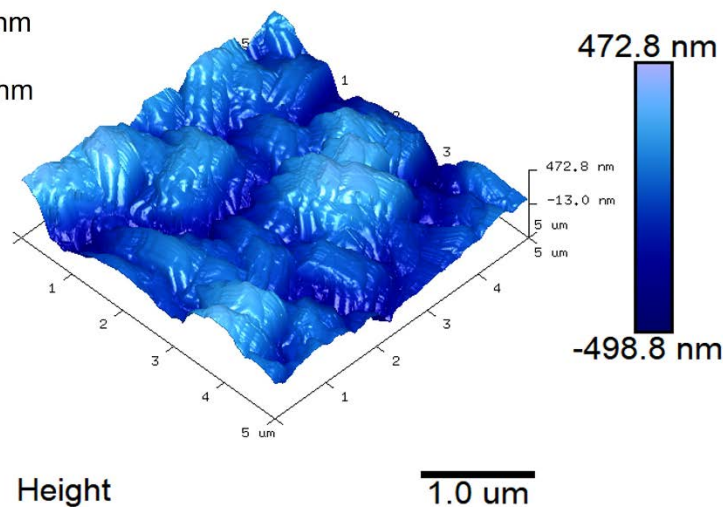


Fig. S1 The hierarchical wrinkles.


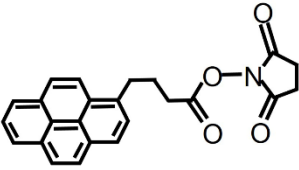


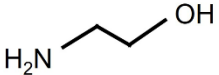

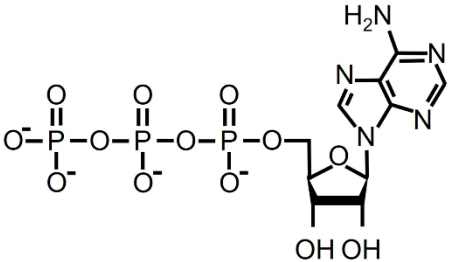
| | |
|--|---|
|  <p>PBASE</p> |  |
|  <p>ATP aptamer</p> | <p>5'-N₂H-AAC CTG GGG GAG TAT TGC GGA GGAAGG T-3'</p> |
|  <p>Ethanolamine</p> |  |
|  <p>ATP</p> |  |

Fig. S2 The sequences of ATP aptamer and the structures of the molecules used in the experiments.

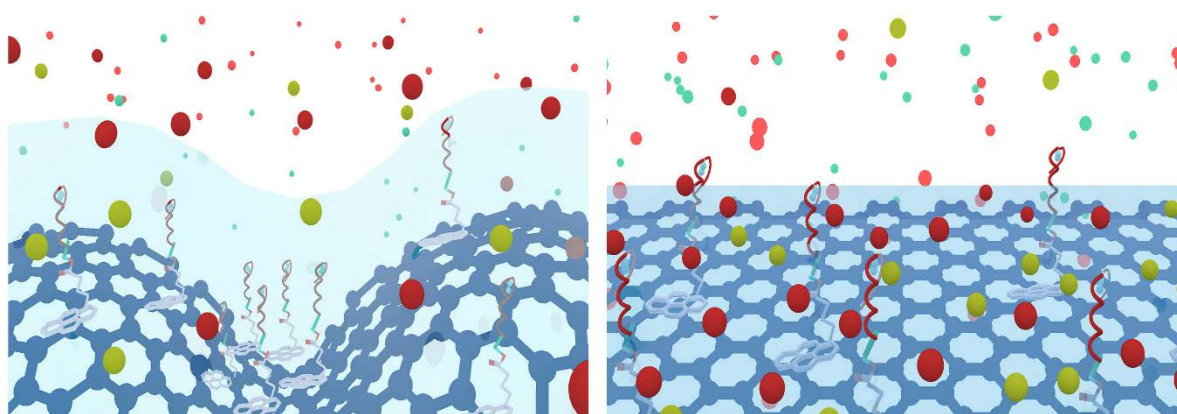


Fig. S3 The Debye length modulation concept after and before the crumpling process.