

Graphene Sensor System for Detection of SARS-CoV-2 RNA in Wastewater

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Abstract

Graphene-enabled nanobiosensors are emerging as a scalable, cost-effective nanotechnology that could be used for fieldable, cost-effective nucleic acid testing with extremely high sensitivity and specificity. We propose a new paradigm of a nano-enabled wastewater testing system to quantify the concentration of SARS-CoV-2 RNA in wastewater samples. We will develop and calibrate a graphene-DNA system capable of measuring SARS-CoV-2 RNA in the concentration range 1 aM – 1,000 nM within tens of minutes. Device design will be based on scalable processing, and the control electronics will be compatible with miniaturization based on commercially available integrated circuits. The approach is compatible with fabrication of large sensor arrays (hundreds or even thousands of sensors) that could be used to quantify the concentration of many different molecular targets in the same wastewater sample.