**Self-propelled catalytic rod-like Gold micromotor**

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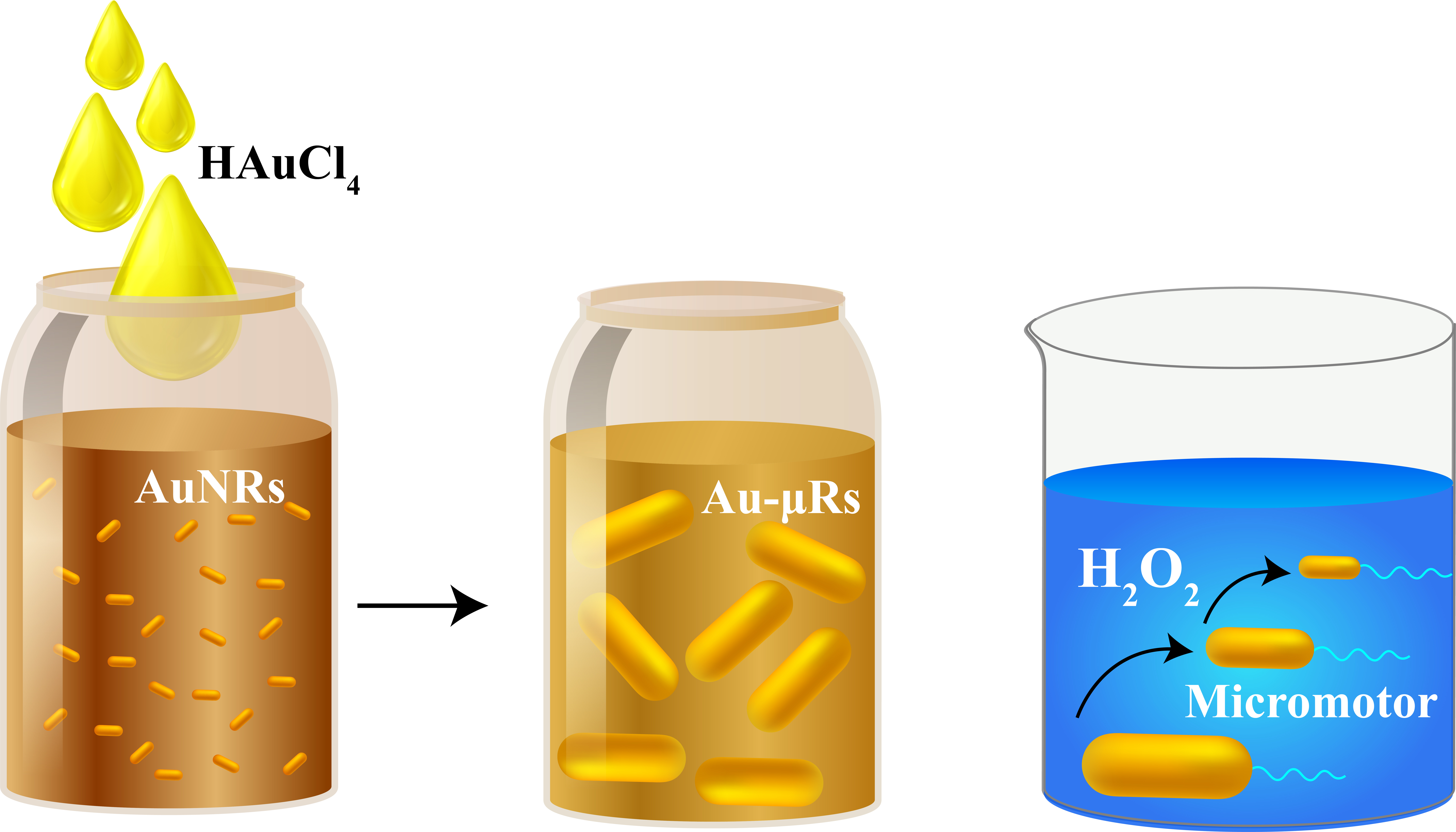
**Abstract**

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Self-propelled, synthetic microscale devices capable of autonomous mechanical movement by utilizing chemical energy are of great research interest in recent times. Herein we report the development of a self-propelled micromotor derived from gold nanorod (AuNR) by invoking anisotropic overgrowth. So far, preferential overgrowth of AuNRs has been realized using chemical methods with a significant setback in sustainability and biocompatibility. This work demonstrates a green approach for the preferential deposition of gold on specific crystallographic facets of gold nanorods synthesized by silver mediated seeded growth method. Gold nanorod solution is prepared by centrifuging the seed solution once, ensuring the removal of excess surfactant and reducing agents. To this solution, 0.216 M gold (III) chloride is added, and the mixture is left overnight undisturbed. The pH is maintained around 7. The exposed facets and remnant-reducing agents facilitate selective longitudinal growth favorable at that pH. Optical microscopy images show the presence of gold micro-rods of sizes ranging from 10-20 micrometers. Etching occurs on gold micro rods from particular facets in the presence of hydrogen peroxide, resulting in propulsion from the longitudinal axis. This property is exploited to develop a self-propelling motor out of an Au micro-rod in an H2O2 medium. Different propulsion speed has been recorded corresponding to different concentration of hydrogen peroxide. These observations enable the Au micromotors to be used as a potential sensing platform for the detection of hydrogen peroxide.

**Keywords:** Micromotors; Au nanorods; Overgrowth; Self-propulsion; Hydrogen Peroxide Sensor



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**Figure 1.** Schematic illustration of the development of Au micromotors