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1P26 - Catalytic and Acoustic Nano/Micromotors

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Nano/micromotors that can convert local chemical fuels or external physical inputs into autonomous motion and perform a variety of advanced functions ranging from active drug delivery to environmental remediation and nanofabrication [1]. Synthetic micro/nanomotors can be self-propelled or externally powered in the liquid phase by different types of energy source such as catalytic, electro/magnetic or acoustic [2]. Several methods including electrochemical/electroless deposition, physical vapor deposition, strain engineering and three-dimensional direct laser writing have been fabrication to create the micro/ nanomotors. Compared with other methods, the plasma-based process is fast and environmentally friendly. By using plasma method the materials can be rapidly prepared onto different substrates at room temperature without using any solvent. Besides, in nanomotors fabrication experiments, plasma methods provide homogeneous coating.
In this study, multiple approaches to powering nanomachines, utilizing individual chemical or physical stimuli, were investigated. In accordance with this purpose, Gold (Au) nanowire prepared by template electrodeposition method for acoustic propulsion and Platinum (Pt) coating for catalytic propulsion RF magnetron sputtering method was used. Fabricated nanomotors were analyzed by Scanning Electron microscopy (SEM) and Mapping analysis. Catalytic and ultrasound propulsion effects were examined on nanomotors speed and direction. For this purpose, speed and direction of nanomotors were investigated by using Optic Microscope (Nikon Ti Eclipse) according to different fuel concentration and acoustic wave power.

[1]. Chuanrui Chen, Fernando Soto, Emil Karshalev, Jinxing Li, Joseph Wang, 2019, Hybrid Nanovehicles: One Machine, Two Engines, Advanced Functional Materials, 29, 1806290.
[2]. Dekai Zhou, Yuan Gao, Junjie Yang, Yuguang C. Li, Guangbin Shao, Guangyu Zhang, Tianlong Li, Longqiu Li, 2018, Light-Ultrasound Driven Collective "Firework"Behavior of Nanomotors, Advanced Science, 5, 1800122.

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