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Title	**Two-step cost-effective electrochemical technology for the preparation of free-standing perforated Au nanomembranes.**
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Description EN	Herein, we propose a room-temperature two-step cost-effective electrochemical technology for the preparation of free-standing Au nanomembranes. A thin Au film with thickness less than 100 nm was deposited by pulsed electroplating on a GaAs substrate wafer in the first step, while electrochemical etching was applied in the second technological step to introduce porosity into the GaAs substrate underneath the Au film. It was shown that detachment of the film from the substrate occurs at optimized parameters of anodic etching. Scanning electron microscopy imaging of the deposited Au film revealed its nanoparticulate structure generated via the mechanism of hopping electrodeposition, i.e. the film proved to consist of a monolayer of Au nanoparticles with the mean diameter around 20-30 nm. It was found that nanoholes with the diameter controlled by the duration of cathodic voltage pulses can be introduced into the Au film during electroplating. The purity of the detached Au nanomembranes was demonstrated by the energy dispersive X-ray analysis. The flexibility and stretchability, along with possibilities to transfer the prepared nanomembranes to various substrates are expected to be prospective for new optical, plasmonic and electronic applications. This work received partial funding form the European Commission under the H2020 grant #810652 'NanoMedTwin' and state program Grant #20.80009.5007.20.
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