Natalia Doroshina[1, a)], Marie Barshutina[1], Nadezda Brazhe[2], Evelina Nikelshparg[2], Dmitry Yakubovsky[1], Aleksey Arsenin[1], Valentyn Volkov[1], and Sergey Novikov[1]
[1]*Moscow Institute of Physics and Technology*
[2]*M.V. Lomonosov Moscow State University*

[a)]*Corresponding author: doroshina.nv@phystech.edu*

SERS substrates based on rose petals imprints for erythrocyte analysis

Surface enhanced Raman spectroscopy (SERS) is a highly selective and sensitive tool to chemically identify and determine the structure of molecules and materials, based on their specific vibrational coupling [1,2]. Plasmon nanostructures allow getting stronger effects and SERS detection of molecules at very low, of the order of nM concentrations. All this is of great interest for the development of bio-sensors, medical diagnostics [1,3]. We present the results of studying the SERS-active substrates (Fig. 1) inspired by natural materials, imprints of rose petals of different colors are formed from silicone and coated with plasmonic materials.

SERS-active surface of imprints consist of 150 nm Au film, intermediate layer of SiO2 and Au nanospheres ~50 nm, fabricated with annealing method. These substrates have shown their effectiveness as SERS biomimetic sensors for detecting cholesterol embedded in the erythrocyte membrane.

The geometry of rose prints perfectly matches the shape and size of blood cells [4,5], which makes them very convenient for studying the biochemical composition of erythrocytes. Ready-made SERS substrates can be used for the diagnosing at an early stage the development of such pathologies such as diabetes, hypertension, obesity, based on studies of individual blood cells.

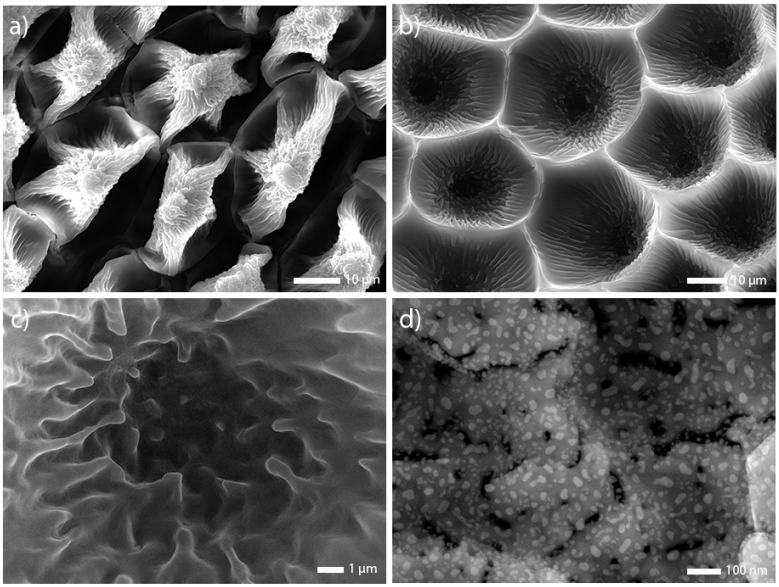

Figure 1. SEM images of a) a rose petal; b-d) a PDMS replica covered with the annealed structure $Au/SiO_2/Au$

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