

# Plasmonic ordered submicron substrate for increasing the sensitivity of the Laser-Induced Breakdown Spectroscopy method

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The results of using a plasmonic ordered submicron substrate to increase the sensitivity of the Laser-Induced Breakdown Spectroscopy (LIBS) method [1] are presented. The increase in the intensity of plasma emission is achieved by increasing the local field due to localized surface plasmons of the structure [2]. The vertical deposition method [3] used to synthesize the substrate is simple and allows control of its morphology to tune the excitation wavelength resonance position in a fairly wide range.

Using computer modeling, the dependence of the maximum local field amplification on the excitation wavelength and geometric parameters of the substrate is investigated. The influence of resonant and non-resonant excitation conditions on the intensity and stability of the LIBS signal is demonstrated. Thus, a new method is proposed to increase the sensitivity of the LIBS in studying the elemental composition of liquid samples, that has a number of advantages over existing ones.

- [1] El Haddad J, Canioni L and Bousquet B 2014 *Spectrochimica Acta Part B: Atomic Spectroscopy* **101** 171–182
- [2] Jain P K and El-Sayed M A 2008 *Nano Letters* **8** 4347–4352
- [3] Jiang P, Bertone J F, Hwang K S and Colvin V L 1999 *Chemistry of Materials* **11** 2132–2140