# Electron-spin resonance; EPR spectroscopy in molecular scale

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This paper presents results of investigations of interactions tunneling electrons with layers of organic matters with property of existing non-paired electrons – free radicals. Some methodic problems of carrying out this kind of investigations and some hardware solutions enabling obtaining geometric positioning of points in molecular scale with specified value of radio signal frequency are described. Special attention is paid to problems of stabilization of work of apparatus and signal filtering.

In carried out investigations source of electrons was a tip of tunneling microscope, which was assembled in the way enabling placing sample in magnetic field with intensity 210 Gauss. This microscope also enables extracting high frequency signal modulating electron stream intensity emitted by tip. Presented results have been obtained by using substation named TEMPOL, also used as test substation in EPR spectroscopy.

The results of investigations of spectrum of emitted radio signal of frequency 600MHz are presented. The obtained results allow to predict further development of investigations in

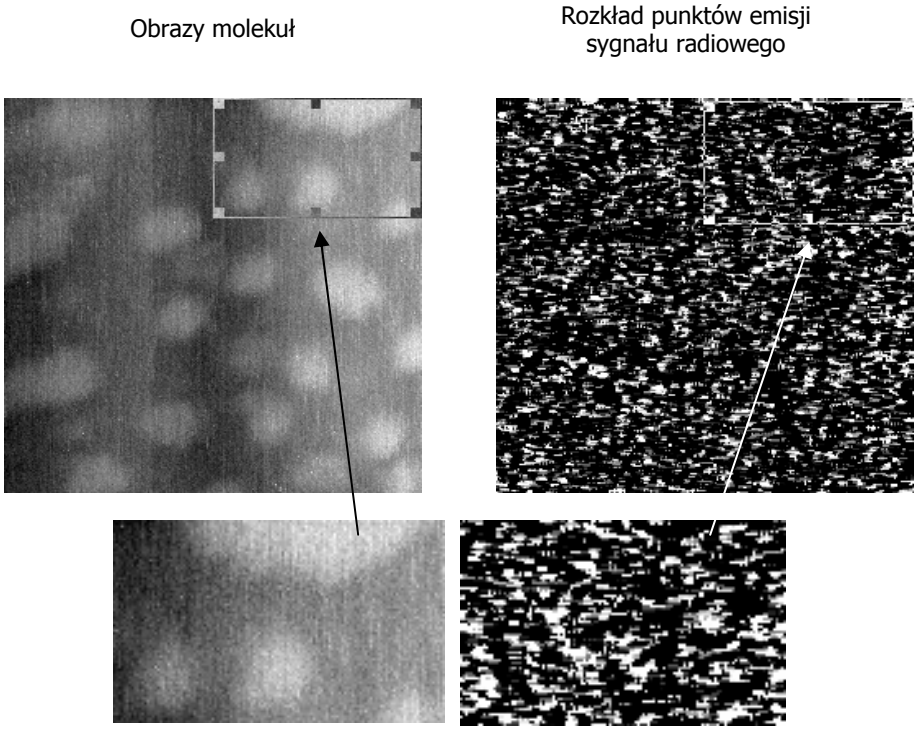


*Fig. 1.* Comparison of topographic image of TEMPOL molecules conglomerate on the surface of gold layer (111) to intensity of emitted radio signal of frequency 605MHz. Scanning area – 50 nm × 50 nm.

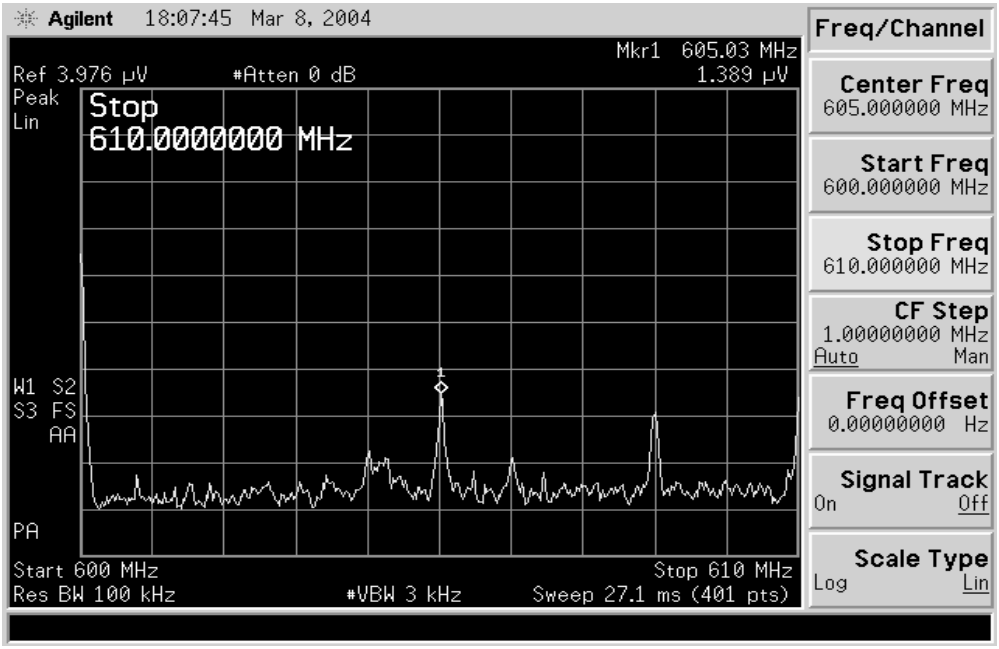


*Fig. 2.* Registration sample of spectrum of high frequency signal emitted as a result of interaction of tunneling electrons with TEMPOL layer.

direction of localizing free radicals in nanometric biological structures and spin localization in modern electronic materials.

[1] C. Durkan, M. E. Welland Appl. Phys. Lett. Vol. 80, No. 3, pp. 458-460, 2002.
[2] Y. Manassen et.al. Phys. Rev. B, vol. 61, No. 23, pp. 16223-16228, 2000.

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