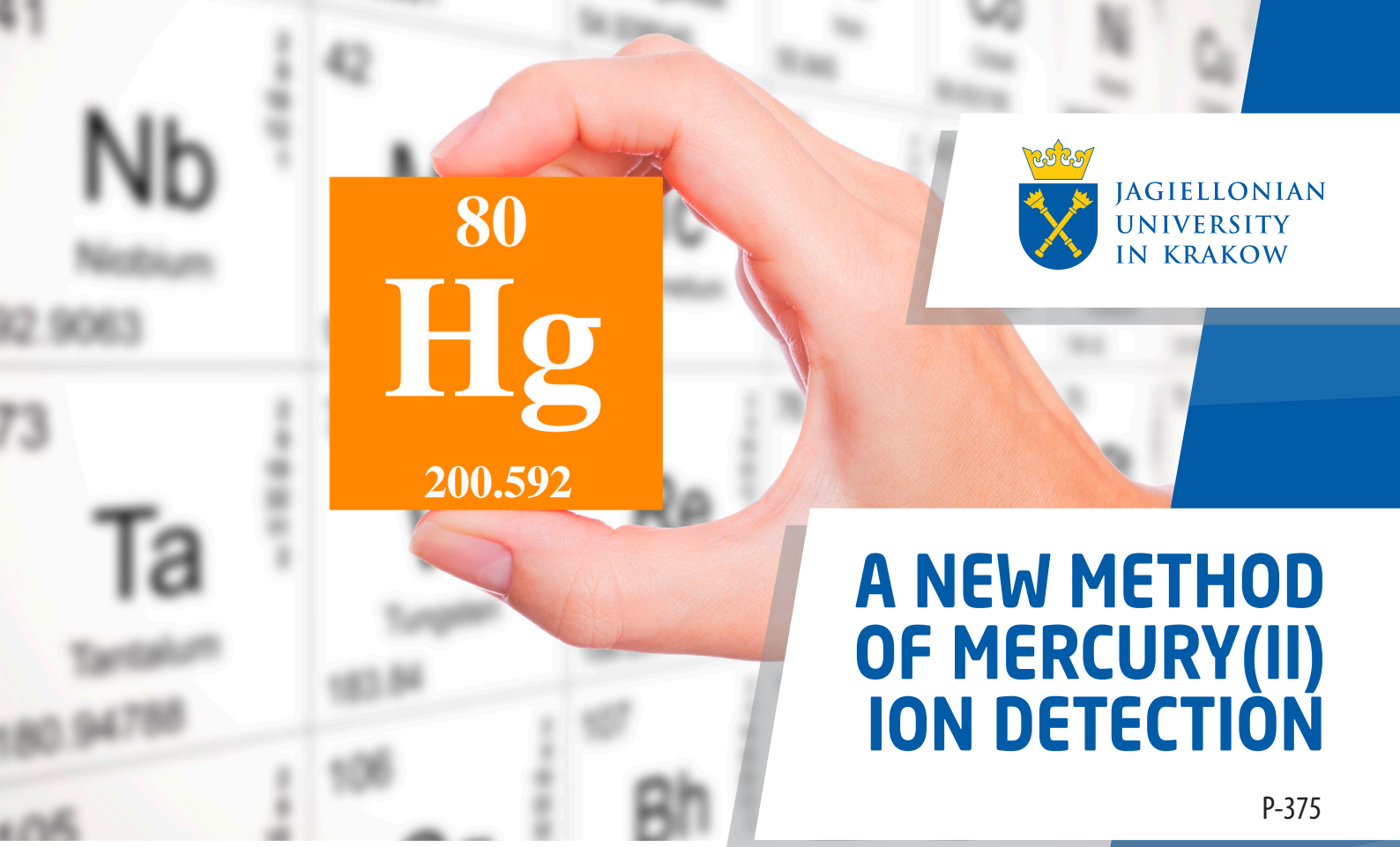

JAGIELLONIAN UNIVERSITY IN KRAKOW

A NEW METHOD OF MERCURY(II) ION DETECTION

P-375

The subject of the offer is an innovative nano-sized mercury(II) ion detector of a high sensitivity, which enables to perform the out of lab measurements (in a mobile manner).

Applications:

environmental, industrial and biomedical analytics

Mercury(II) ion detection

Mercury is a seriously dangerous element present in the Earth's atmosphere as well as inland and sea waters in both, metallic and ionic form. Mercury belongs to the most toxic heavy metals, that affect adversely the environmental balance and human physiological processes as well. Because of the extremely high ecotoxicity and the ability of mercury to accumulate in living organisms (about 75-80% of the adopted dose accumulates in the human body), the reduction of its emission is one of the top priority needs from the point of human health. The threats related to the utilizing and propagation of mercury in the biosphere underlie the increasingly restrictive requirements that force to reduce or (if possible) even eliminate this metal from numerous practical applications and technological processes. Nevertheless, mercury is still fairly widely used and, as a consequence, it is constantly present in the environment. The current worldwide legal regulations regarding the reduction of mercury emission necessitate the monitoring of the profiles of its concentration in the environment, which implies the need to develop more and more accurate and versatile methods for determination of mercury in industrial, environmental and biomedical samples. Despite the possibility of determining of low concentrations of mercury by means of the conventional analytical methods (i.e. ASA, ESA, ICP-MS), these techniques have many drawbacks, such as complicated and time-consuming sample preparation, lack of apparatus mobility, and the necessity of engagement of highly-qualified staff. The present invention allows to eliminate these problems and exhibits a high analytical sensitivity.

Paula Janus, Ph.D.

Technology Transfer Officer
Phone: +48 12 664 42 16
506 006 590,
pa.janus@uj.edu.pl
www.sciencemarket.pl

CITTRU

Technology

The construction of a hybrid Hg^{2+} ion sensor is based on the use of quantum dots surrounded by a polymer layer. The sensor allows the detection of mercury ion at very low concentrations (even below 10-15 mol/L). Additionally, the sensor is characterized by high selectivity towards Hg^{2+} in the presence of other ions. The detection of Hg^{2+} is manifested by the appearance of a physical effect - the intensity of fluorescence of quantum dots at the wavelength of 550-560 nm is strongly amplified.

The essential advantages of the invention are the following:

- ✓ the ability to determine mercury(II) ion in a minimally-invasive way, the analysis are effortless, requiring no specialistic knowledge in the analytical chemistry and equipment skills;
- ✓ the possibility of detection of very low concentrations of mercury ions (less than 10-15 mol/L);
- ✓ the ability to analyze the mercury(II) ions in the presence of other heavy metal ions (high selectivity; lack of interference effects);
- ✓ the higher sensitivity of mercury ion detection compared to currently used methods.

The offered solution is subject of a patent application. Further development of the invention is performed at the Faculty of Chemistry, Jagiellonian University. Currently, Centre for Technology Transfer CITTRU is looking for entities interested in licensing and application of the technology described above.