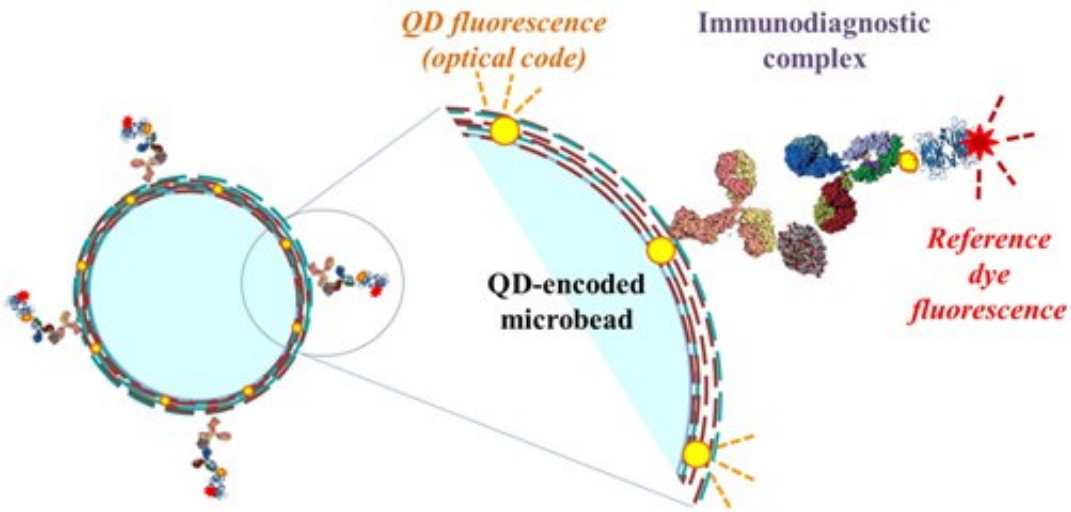
Scientists complete development of a new system for cancer diagnostics

July 13 2016



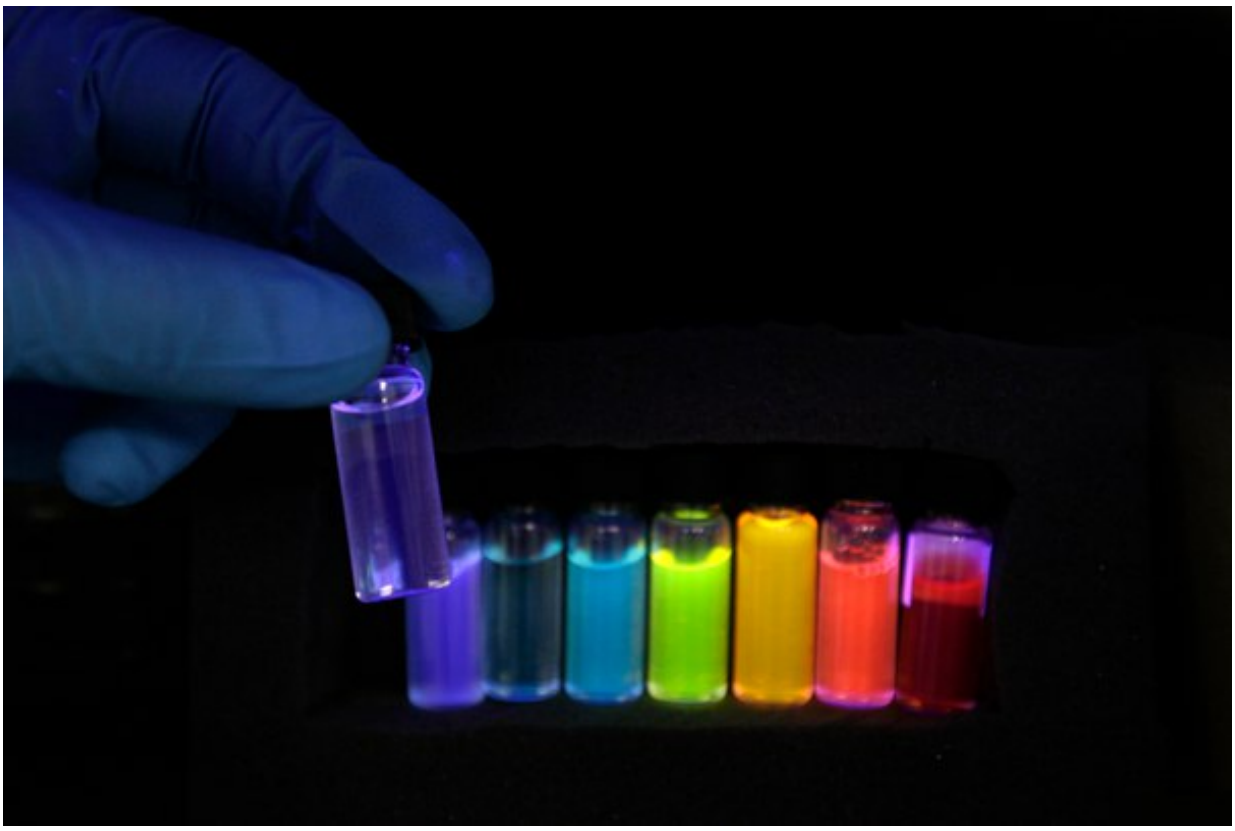
The diagnostic nanoprobe. Credit: National Research Nuclear University

Scientists from the National Research Nuclear University MEPhI in cooperation with colleagues from Pohang University of Science and Technology of the Republic of Korea are at the final stage of the development of a unique nanosystem for early diagnosis of oncological diseases.

The nanosystem, a Korean-designed diagnostic nanoprobe, consists of a brightly fluorescent semiconductor particle several nanometres in size that shines in the infra-red spectral band, with special molecules—single-

domain antibodies—which Russian researchers connected to its surface. These are capable of detecting certain cancer cells and connecting with them, making them visible to scientists. The current nanosystem uses antibodies from lamas, camels and sharks, because compared to antibodies from other animals, these have a simpler structure and a smaller size. The result is the highest-efficiency system for the detection of cancer cells that has ever been reached in animal experiments.

"The main advantage of the new nanoprobe is its small size—the diameter of the resulting diagnostic labels is 13 times smaller than existing analogues. It is also highly stable—the nanoprobe doesn't decompose at high temperatures—and it is very specific in the detection of cancer cells," said Igor Nabiev, the leading scientist of MEPhI interdepartmental Laboratory of Nano-Bioengineering.



Using nanocrystalls as fluorophores in LNBE MEPhI. Credit: National Research Nuclear University

He added that "the fluorescence of the nanoparticles in the infra-red band allows researchers to use the transparent region of biological tissues, which, together with nanoprobe's high light intensity allows depth of penetration, detecting cancer cells in practically in every part of the body."

According to the scientist's words, the new diagnostic system uses molecules that detect cells of breast and prostate cancer. However, the application of other detecting molecules will allow diagnosis of other oncological, infectious, inflammatory and immune diseases. Apart from diagnostics, the probes can be applied for the D2D of medicines.

Scientists are currently in the final stage of development, and have made applications for two patents. The incorporation of the new diagnostic system into medical practice is expected to be occur in two to three years after the end of the project and the completion of pre-clinical and clinical trials.

Provided by National Research Nuclear University