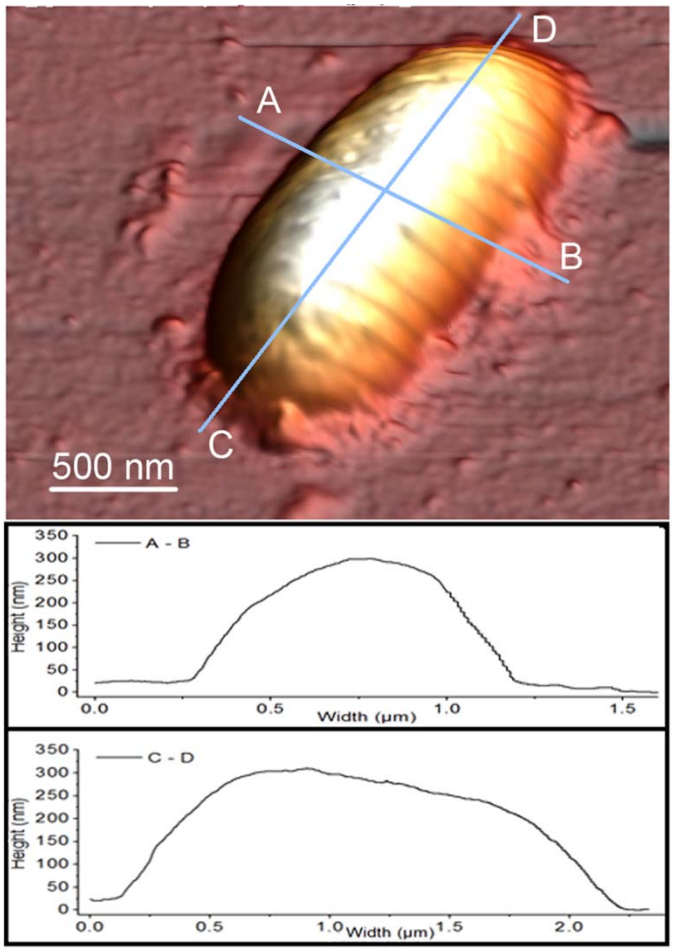
Nanophotonic Device for Rapid Detection of *Escherichia coli* bacteria

In a recently published paper in Nanotechnology (G. Marshall et al., Nanotechnology **22**, 235704 (2011)), a group led by Prof. Dubowski at the Université de Sherbrooke has outlined the principle of taking advantage of the quantum semiconductor (QS) photoluminescence effect for monitoring the process of electrically charged molecules interacting with biofunctionalized surfaces of III-V semiconductors. Since viruses and bacteria carry out a significant amount of negative charge, this approach is well suited to detect those molecules. As a result of an extensive study carried out in the frame of the NanoQuébec supported program on 'Integrated Biosensor Technologies', Dubowski's group was able to demonstrate rapid detection of *Escherichia coli* at 10^4 CFU/mL. To produce such a result, it takes less than 120 min from the moment of exposing the biofunctionalized surface of a QS biosensor to a water solution of *E. coli*. "We are interested in rapid analysis of water samples for the presence of different bacteria and the results produced by Prof. Dubowski's group are encouraging," says Dr. Jean Jacques Drieux – Vice President Innovation – R&D at Magnus Inc., and adds: "The QS biosensor technology has the potential to deliver an attractive device for remote biosensing." Dubowski and his group have collaborated with Magnus, Inc. on this issue for several years. The current research efforts are concentrated on multiplexed biosensing and increased sensitivity of the method to below 10^2 CFU/mL. "It is a matter of time for the QS photonic biosensing technology to demonstrate detection of a single bacterium", says Prof. Dubowski. "This will take place in a laboratory environment, thus it will not necessary translate into an attractive proposition for an individual user. We have to be conscious about the cost of biosensing that would be acceptable for an individual user or an industrial laboratory. We are still about 3-4 years before a fully automated prototype for rapid detection of bacteria will be available for the evaluation by potential users", adds Prof. Dubowski. For more information, please see: http://www.dubowski.ca.



Atomic force microscopy image of an individual *Escherichia coli* bacterium immobilized on the antibody functionalized GaAs surface of a quantum semiconductor biosensor (V. Duplan, E. Frost and J.J. Dubowski, Sensors and Actuators B (2011)).