UNIVERSITY OF WATERLOO

TECHNOLOGY SUMMARY

Room Temperature Plasmontronic Devices

Background

Advances in nanotechnology science continue to support developing capabilities to finely tune, control and manipulate the properties of molecules and materials in reduced dimensions (eg. spin, anisotropy, redox potential, light, electrical field, etc) in a manner that enables the creation of new tunable semiconductor electronics including devices utilizing quantum properties.

Spintronics is one such example of an emerging technique that takes advantage of electron spin properties to yield novel tunable semiconductor devices. However, a significant drawback to these devices is the need to generally operate at low temperatures. Furthermore, the sizes of potentially practical spintronic devices are limited by the critical size necessary to support long range ferromagnetic interactions (generally considered to be on the order of 100 nm). Despite much research intensity there have not yet been any broadly viable solutions to address these hurdles to more practical utilization of spintronic devices.

Description of the invention

A novel nanocrystal material has been developed that enables the coupling and mutual control of plasmonic and semiconductor band structure properties.

Advantages

This novel nanocrystal and processing methodology represents a radically new approach for non-volatile electronic information processing devices, including possibly quantum devices, at reduced dimensions, **faster processing with lower power, and most importantly, operating at roo**m temperature. One of the main advantages is that this technology is fully compatible with existing semiconductor industry manufacturing process enabling cost effective adoption of the new devices.

Potential applications

- nonvolatile magnetic computer memory, or “plasmonic random access memory” (PRAM)
- enables novel semiconductor and quantum device possibilities.

Reference
10127

Inventor(s)
Dr. Pavle Radovanovic

Patent status
Provisional patent application filed

Stage of development
Prototype
Ongoing research

Contact
Scott Inwood
Director of Commercialization
Waterloo Commercialization Office
519-888-4567, ext. 33728
sinwood@uwaterloo.ca
uwaterloo.ca/research