Deployment-Ready Quantum Nanomagnetic Sensors and Packaging Methods for Canadian Industries

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DETAILS

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Abstract

Atomic defects in diamonds offer the potential to serve as room-temperature quantum sensors, enablingprecise monitoring of temperature, pressure, and electromagnetic fields with unprecedented precision. Diamond-based quantum magnetosensors offer extremely promising applications in orbital magnetosphere mapping, low-altitude mapping for mineral prospecting, and ground-level boarded sensors for defense and environmental applications. Being in their technological infancy, these diamond devices struggle to rival their non-quantum counterparts but do present tremendous potential for improvement. By combining the expertise of SBQuantum, the Université de Sherbrooke (UdeS), the University of Calgary (UofC), and two National Research Council (NRC) centers, we propose to bring these quantum magnetosensors to their full deployment potential and lead the Canadian quantum technology industrial ecosystem to new horizons.
The project is a transformative proposal that has the potential to revolutionize production processes and the Canadian quantum sensing technology landscape by significantly improving the sensitivity, cost, size, power consumption and industrial applications of magnetic quantum sensors. This will be accomplished by producing and commercializing nanointegrated quantum magnetometers for high sensitivity, accuracy, and cost efficiency. To realise this, we will develop a scalable diamond-based quantum sensor fabrication process and demonstrate a robust industrial packaging methods to establish a Canadian assembly line for quantum photonic products. The initiative also targets the advancement of applications for the Canadian mining industry with quantum sensing technology for ore processing and the deployment of drones for advanced exploration surveys. Finally, our industrial partner will distribute those quantum sensing solutions to domestic and international clients.