

## Monitoring Ion Channel Function in Real Time through Quantum Decoherence

Thu, 2011-02-17 11:49 - [Daniel Rudolph](#) [1] **Date:** 2010-10-11

**Author(s):**

L. T. Hall, C. D. Hill, J. H. Cole, B. Städler, F. Caruso, P. Mulvaney, J. Wrachtrup, L. C. L. Hollenberg

**Reference:**

Proceedings of the National Academy of Sciences of the United States of America (PNAS), Vol. 107, no. 44, 18777-18782, 2010

**URL:**

<http://www.pnas.org/content/107/44/18777.abstract> [2]

In drug discovery, there is a clear and urgent need for detection of cell-membrane ion-channel operation with wide-field capability. Existing techniques are generally invasive or require specialized nanostructures. We show that quantum nanotechnology could provide a solution. The nitrogen-vacancy (NV) center in nanodiamond is of great interest as a single-atom quantum probe for nanoscale processes. However, until now nothing was known about the quantum behavior of a NV probe in a complex biological environment. We explore the quantum dynamics of a NV probe in proximity to the ion channel, lipid bilayer, and surrounding aqueous environment. Our theoretical results indicate that real-time detection of ion-channel operation at millisecond resolution is possible by directly monitoring the quantum decoherence of the NV probe. With the potential to scan and scale up to an array-based system, this conclusion may have wide-ranging implications for nanoscale biology and drug discovery.

- [SOLID](#) [3]

**Source URL:**

<http://qurope.eu/db/publications/monitoring-ion-channel-function-real-time-through-quantum-decoherence>

**Links:**

[1] <http://qurope.eu/users/drudolph>

[2] <http://www.pnas.org/content/107/44/18777.abstract>

[3] <http://qurope.eu/category/projects/ips/solid>