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Nanoparticle communications: from chemical signals in nature to wireless sensor networks

ABSTRACT. The need to convey information has always existed in both the animal and human kingdoms. The article offers a review of the latest developments in transporting information using nanosized particles. It begins by examining chemical signalling in nature, and goes on to discuss recent advances in mimicking this in bio-inspired engineering. It then points out the important difference between signalling and general communication, and explains why the latter is a more challenging problem. The existing research on mimicking chemical signalling in nature is a precursor to research into general chemical communication. A review of the latest theoretical research in general chemical communications is presented, along with the practical developments of the world's first nanoparticle communications test-bed. In the parts of the article, the authors discuss the potential research challenges and identify three important areas for future development: robustness, miniaturization, and scalability.

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