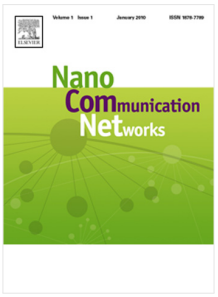
Accepted Manuscript



Position-based modulation in molecular communications

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PII: S1878-7789(17)30075-3
DOI: https://doi.org/10.1016/j.nancom.2018.01.004
Reference: NANCOM 200

To appear in: *Nano Communication Networks*

Received date : 29 June 2017
Revised date : 31 October 2017
Accepted date : 22 January 2018

Please cite this article as: B.C. Akdeniz, A.E. Pusane, T. Tugcu, Position-based modulation in molecular communications, *Nano Communication Networks* (2018), https://doi.org/10.1016/j.nancom.2018.01.004

Position-based Modulation in Molecular Communications

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Abstract

Molecular communications via diffusion (MCvD) is a new paradigm that aims establishing communications among nanomachines in a fluidic diffusive channel using messenger molecules. In general, encoding and decoding of messages are done by the number and/or type of the molecules. Concentration Shift Keying (CSK) is the earliest and simplest communication scheme that encodes and decodes information. However, due to the dynamics of diffusion, one of the major challenges in MCvD channels is Inter Symbol Interference (ISI), which degrades the communication quality in CSK and leads to an error floor. In order to cope with this problem, various solutions have been proposed in the literature. Many of them require the use of multiple types of molecules, which results in an additional cost and computational complexity. This paper proposes a novel modulation scheme in molecular communications using the Pulse Position Modulation (PPM) concept that utilizes a single type of molecule and a corresponding simple receiver structure. Conventional PPM scheme is modified for the molecular communications channel and is shown to be better than CSK and other modulations in the literature, due to its robustness to ISI. Another advantage of PPM is not requiring knowledge about the channel as in other modulation schemes.

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