Abstract Submitted
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Effective Translational Diffusion of Nanorotors as Rotary Powered Random Walkers AMIR NOURHANI, PAUL LAMMERT, Phys. Dpt., Penn State Univ., ALI BORHAN, Chem. Eng. Dpt., Penn State Univ, VINCENT CRESPI, Phys. Dpt., Penn State Univ. — The coupling of the orientational stochastic dynamics and rotary powered dynamics at different dimensions leads to an effective translational diffusion of a rotary powered random walker. In a conventional nanorotor system, moving in two-dimension close to a substrate, the one-dimensional orientational stochastic dynamics couples to the rotary deterministic motion and leads to an effective two-dimensional translational diffusion, which is chiral in short to medium time scales. If a nanorotor can have three-dimensional dynamics, an emergent three-dimensional effective diffusion would be the outcome of the coupling between three one-dimensional orientational stochastic processes and a two-dimensional deterministic rotation in the plane of motion. Such effective diffusion processes are a property of nanoscale where the deterministic and stochastic dynamics are both significant.

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