Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Diffusional Variation in Autonomously Motile Catalytic Janus Particles[1] R. LLOYD CARROLL, SHENGRONG YE, ZACHARY JONES, West Virginia University Department of Chemistry — Recently, we and others have studied the motion of Janus particles that undergo catalytically-induced motion in an appropriate chemical environment. Published studies indicate particles move with reduced rotational diffusion, resulting in enhanced effective diffusion coefficient – motile particles move longer distances between each random rotation, resulting in much greater overall motion. We undertook to study the effective diffusion coefficient of janus particles with various structural designs (symmetric and asymmetric anisotropy, angular dislocation of catalytic regimes) and under environmental stresses (external fields, imposed gradients). We find that structural features have a strong effect on the characteristics of observed motion and effective diffusion, and that environmental stresses can change particle dynamics, suppressing rotational diffusion and enhancing correlated motion. These results are consistent, with some caveats, as particles grow smaller, and the effects of Brownian motion become more pronounced. Deeper understanding of the statistical behavior of the systems results in particles with practical applications in transport on a microfluidic scale.

[1]We acknowledge the support of WVnano and the use of WVNano Shared Research Facilities

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Date submitted: 11 Nov 2011 Electronic form version 1.4