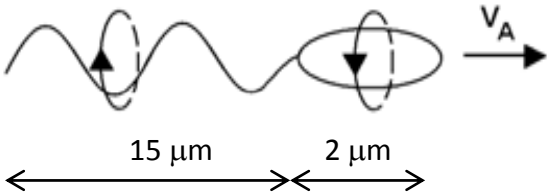
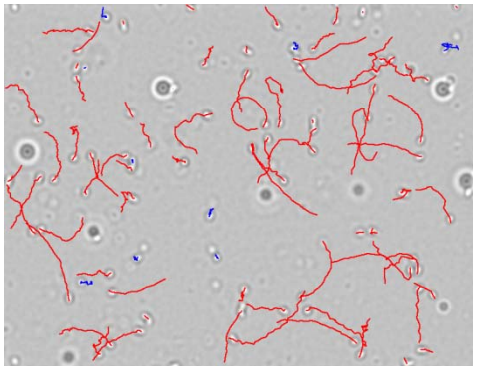
Enhanced diffusion due to active swimmers at a solid surface

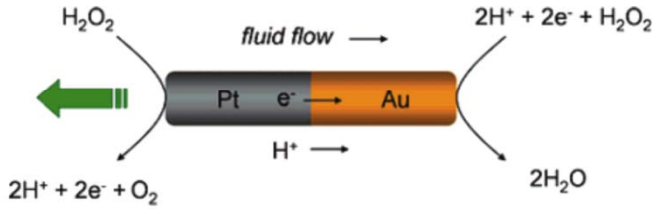
Living System



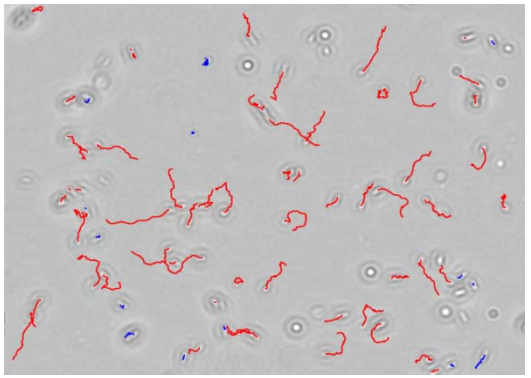
- Isodense suspension (MMA+Percoll),
- Polyvinyl pyrolidone (PVP) to avoid stickiness to the wall.
- Latex passive tracers d=1 and 2μm diameter *(ρ=1.027g/ml).*



Artificial System

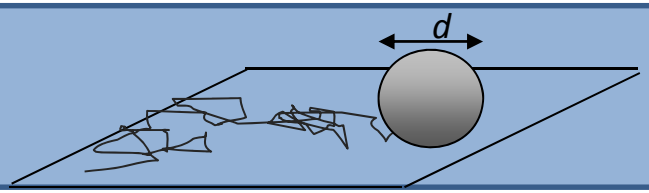


- Open chamber (without the upper wall).
- Nanorods (ρ=17g/ml) and passive particle in water + H_20_2 *(5-15 %).*
- Latex passive tracers d =1 μm (ρ=*1.8g/ml)* and d=2 μm *(ρ=1.027g/ml)*.



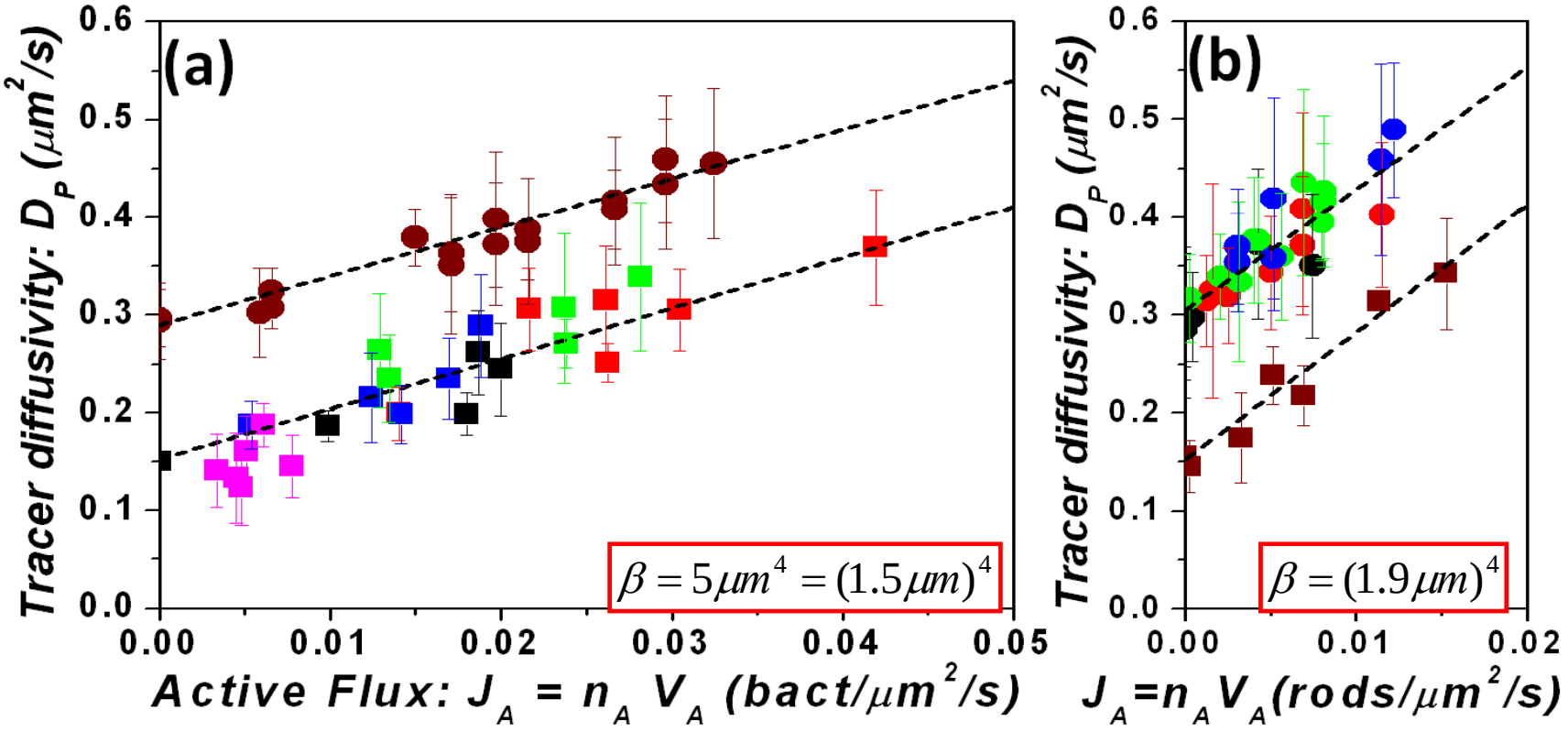
Tracking at the wall both for swimmers and passives tracers motion

$$\mathrm{Re} \approx 10^{-5}$$



Gastón Miño *et al.*, Phys. Rev. Lett. (2011)

Results



$$D_P = D_P^B + \beta J_A$$

$$D_P^B = \alpha D_B = \alpha \frac{k_B T}{3\pi\eta d}$$

α= hydrodynamic screening

- At the wall, the enhanced diffusivity of a passive particle increases linearly with the Active Flux.
- The activation effect is similar for artificial swimmers and wild- type bacteria.