The understanding of natural microswimmers movement near surfaces in porous environments is essential for the comprehension of their single and collective motion. Microswimmers in a shear flow often exhibit rheotaxis, which is the active response to the background flow. Natural pusher and puller swimmers exhibit dipolar far-field flow profile that result in different behavior near boundaries or in imposed flows.

We have investigated the behavior of Janus (Au/Pt) rods with various Au:Pt length ratios moving upstream by rheotaxis. Numerical models and experiments reveal that nanorods switch between pusher and puller propulsion depending on the position of the junction. Pullers that swim with an angle with respect to the wall smaller than other swimmers show a weaker rheotactic response. This finding suggests new approaches for sorting and guiding of swimmers based on their flow signature.

**Figure.** Upper panel. The rheotaxis of active nanorods is linked to their geometry and equilibrium position in a shear flow. Lower panel. Asymmetric rods tested in microchannels show that puller are weaker “rheotactors” than pushers. Numerical simulations quantitatively agree and links this difference to the osmotic flow developed by pullers which impose a smaller angle $\alpha$ between the rod and the substrate.