

DSM Science & Technology Awards (SOUTH) 2009	
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One of great scientific challenges is the creation of micro- and nanomachines that can deliver drugs, transport microobjects in Lab-on-Chip, bio-sense environment. The principle of 'nanorocket motility' is used by bacteria for a long time, for example, *listeria monocytogenes* self-propel by actin polymerization, *mixococcus xanthus* contain nanonozzles which drive cells. My project concerns development and application of microjet engines effective at low Reynolds numbers with radiuses from micrometers to nanometers and made of functional nanomembranes (catalytic, magnetic, soluble). We demonstrated that microjets self-propel in a fluid with velocities up to 2 millimeters per second (50 body length/s), can assemble and transport microcargo, their navigation can be controlled by magnetic fields. Intriguing application includes autonomous microtrajectories programming to realize self-powered biosensors. Our results and literature reports show interesting collective behavior of micromotors self-organization in mesoscale schools, which can be related to a model of quorum-sensing or 'predator-prey' behavior in biology. It can help us to find the way towards intelligent interactive micromachines.