BIOLOGICALLY INSPIRED NANO-MOTOR

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Abstract
The classical interpretation of the muscle cell function based on the complex bio-chemical reactions is rather difficult to apply in engineering. It is purposeful to propose an alternative model of muscle function, which can provide the engineering science with a simple analogy to the biologically inspired motor in nano-scale. The function of the key element of the nano-motor is based on a mutual alternating slipping of two systems of filaments. Its contraction is caused by the attractive effect of van der Waal's forces between the functional particles among the filaments. The relaxation is attained through the repulsive effect of the electrostatic repulsive forces between the functional particles. The alternating change of ionic concentration in the area of the particles results in the alternating function of repulsive electrostatic forces and van der Waal's attraction. The size and the kind of the material of the particles, their configuration and working temperature must be specifically optimized. Large compound actuators with high performance can be built from key elements using the modular design for applications in engineering or implants in medicine. Nanotechnology enables engineers to apply the nano-motor at a level comparable to that of mammalian skeletal striated muscles evolved in the course of hundreds of millions of years. The principle has been patented in the USA (US 7,994,685 B2) and in the Russian Federation (Eurasian patent 013443).

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