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Directed locomotion of bimetallic synthetic nanomotors JONATHAN POSNER, PHILIP WHEAT, JEFFREY MORAN, CHRISTINE BURDETT, J. BURDICK, Arizona State University, R. LAOCHAROENSUK, Laocharoensuk, P. CALVO-MARZAL, K. MANESH, D. KAGAN, S. BALASUBRAMANIAN, M. CARDONA, G.-U. FLECHSIG, JOE WANG, UC San Diego — Controlled motion of synthetic nanoscale motors may represent a major step towards the development of practical nanomachines and autonomous microsystems. Bimetallic nanorods can autonomously propel themselves at hundred of body lengths per second through aqueous solutions by using hydrogen peroxide as a fuel. The magnetic and chemical controlled motion of Pt-Ni-Au nanorods is presented. The magnetic properties of nickel-loaded nanomotors offer controlled cargo manipulations, including en-route load, drag and release of spherical cargo that have volumes two orders of magnitude larger than the nanomotors itself. Nanomotors can be directed through microfluidic channel networks and motion triggered using locally generated chemical species. The nanomotor locomotion force is determined by measuring the velocity of motors towing spherical cargo. The nanomotors approximately generate 0.16 picoNewtons of force and can transport microscale cargo with a coefficient of Stokes drag that is eight times their own.

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