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Adhesion of Photoactive Microalgae to Surfaces is Switchable by Light OLIVER BÄUMCHEN, CHRISTIAN KREIS, MARINE LE BLAY, CHRISTINE LINNE, MARCIN MAKOWSKI, Max Planck Institute for Dynamics and Self-Organization — The natural habitats of many microorganisms are confined geometries, such as the interstitial space of rocks and soil, where interactions with interfaces and surfaces are of paramount importance. We performed *in vivo* force spectroscopy experiments on the unicellular biflagellated microalga *Chlamydomonas*, a prime model organism in cell- and microbiology, and discovered that the flagella-mediated adhesion to surfaces can be switched on and off by light [1]. Time-resolved micropipette experiments show that the light-switchable adhesiveness of the flagella is a completely reversible process that is based on a redistribution of adhesion-promoting flagella-membrane proteins within seconds. Light-switchable adhesion enables the cell to regulate the transition between planktonic and surface-associated state, which possibly represents a significant biological advantage for photoactive microorganisms. In terms of the colonization of surfaces and the formation of biofilms, the findings might have immediate economic and environmental relevance in biotechnological settings, such as photo-bioreactors for the sustainable production of biofuels. [1] C. Kreis, M. Le Blay, C. Linne, M. Makowski, and O. Bäumchen, in review (2016).

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