

# Patterning graphite for spatiotemporally-controlled translation of unidirectional motors

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Since the advent of scanning probe microscopy (SPM) techniques in the scientific community, the non-covalent functionalization of surfaces has become a major research topic. The surface-supported assembly of rationally designed compounds (2D crystal engineering) has produced so far a multitude of structures and patterns, where the interplay of intermolecular and molecule-surface interactions control the molecular arrangement.<sup>1,2</sup> However, little attention has been dedicated to the use of self-assembled monolayers as initial platforms for surface-based supramolecular chemistry. Advancing the field in such direction will certainly expand the chemical fundamental knowledge, but also result in a number of novel applications where spatial control of the interacting units is achieved with molecular resolution. Creating an artificial mimic of the kinesin motor walking on microtubules represents one of the most intriguing goals in this field. In this contribution we will present our strategy towards the achievement of the spatiotemporally-controlled translation of unidirectional motors,<sup>3</sup> developed in the Feringa labs, on graphite substrates appropriately functionalized with “molecular highways” composed of alkane-based “block molecules”,<sup>4</sup> developed in the Meijer labs (Figure 1).

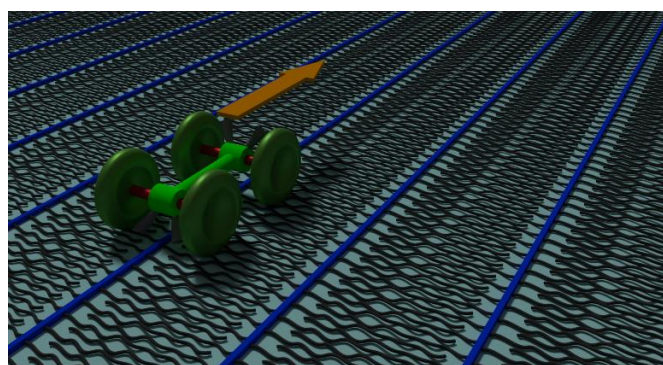


Figure 1. Unidirectional motor translating on “molecular highways”

1. Elemans, J. A. A. W.; Lei, S.; De Feyter, S. *Angew. Chem. Int. Ed.* **2009**, *48* (40), 7298-7332.
2. Ciesielski, A.; Palma, C.-A.; Bonini, M.; Samorì, P. *Adv. Mater.* **2010**, *22* (32), 3506-3520.
3. Kistemaker, J. C. M.; Štacko, P.; Visser, J.; Feringa, B. L. *Nat. Chem.* **2015**, *7*, 890– 896.
4. Berrocal, J. A.; Teyssandier, J.; Goor, O. J. G. M.; De Feyter, S.; Meijer, E. W. *Chem. Mater.* **2018**, *30* (10), 3372–3378.