DNA-based nanodevices controlled by purely entropic domains

Francesco Ricci[1]

[1] *Chemistry Department, University of Rome, Tor Vergata, Rome, Italy*
Email: francesco.ricci@uniroma2.it

Many proteins employ conformational entropic contribution of domains that are not directly involved in the recognition event to better control their activity. Such property allows a fine regulation of proteins response and activity in a very versatile and precise way.
Inspired by this mechanism, we report a convenient and versatile approach to control the activity and response behavior of synthetic molecular recognition systems by rationally designing intrinsically disordered domains. To do so and to highlight the versatility and generality of this approach, we have rationally re-engineered three DNA-based receptors: a clamp-like DNA-based switch that recognizes a specific DNA sequence, an ATP-binding aptamer and a pH-sensitive switch.

We demonstrate that, similarly to intrinsically disordered proteins, it is possible to finely modulate the activity of such molecular nanodevices through a purely entropic contribution.
This approach appears as a versatile and general approach to finely control the activity of synthetic receptors in a highly predictable and controllable fashion.