Electronic Supplementary Material (ESI) for Polymer Chemistry.


Supplementary Information for

# Single-molecule imaging reveals topological isomer-dependent diffusion by 4-armed star and dicyclic 8-shaped polymers

Satoshi Habuchi[*†], Susumu Fujiwara[‡], Takuya Yamamoto, Yasuyuki Tezuka[*‡]

[†] Biological and Environmental Sciences and Engineering Division, King Abdullah University of Science and Technology, P.O. Box 4700 KAUST, Thuwal 239500-6900, Kingdom of Saudi Arabia.

[‡] Department of Organic and Polymeric Materials, Tokyo Institute of Technology, 2-12-1 O-okayama, Meguro-ku, Tokyo 152-8552, Japan.

**Supporting Text**

**Figure S1**

**Movie S1.avi**: An example of fluorescence images of **1** in the linear poly(THF) matrix

**Movie S2.avi**: An example of fluorescence images of **2a+2b** in the linear poly(THF) matrix

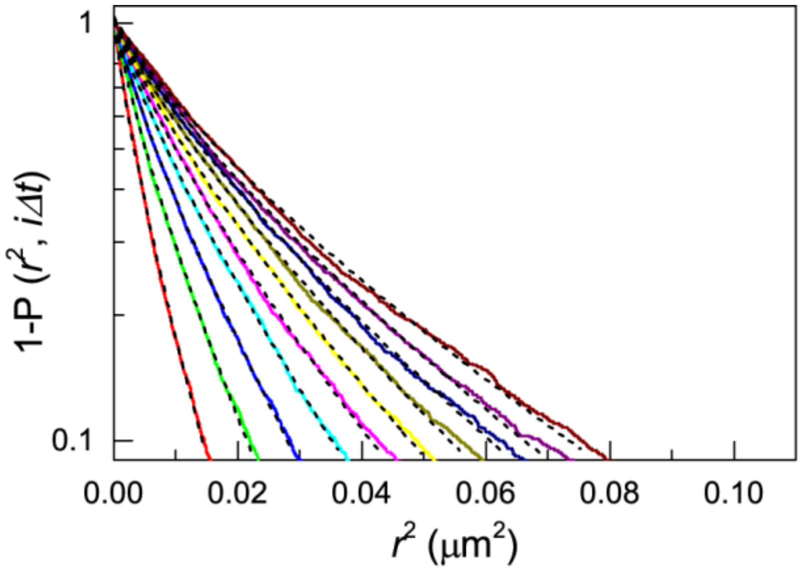
**Calculation of gyration radius**

Gyration radius ($R_G$) of a flexible polymer chain which has *N* Kuhn monomer and Kuhn length of *b* can be calculated by equation S12 and S13.[1]

$$\left\langle {R_G}^2 \right\rangle = \left(\frac{N}{f}\right)\frac{b^2}{6}(3 - 2/f)\ (f - arm\ star\ polymer) \tag{S1}$$

$$\left\langle {R_G}^2 \right\rangle = \frac{Nb^2}{12}\ (cyclic\ polymer) \tag{S2}$$

Assuming the physical properties of poly(THF) are similar to those of poly(ethylene oxide), *b* of poly(THF) is estimated to be *b* = 1.1 nm. The Kuhn monomer numbers are 76, 58 (per ring), and 23 for **1**, **2a**+**2b**, and linear poly(THF), respectively. Therefore, the gyration radii of **1**, **2a**+**2b**, and linear poly(THF) are calculated to be 3.1 nm, 2.4 nm (per ring), and 2.2 nm, respectively.



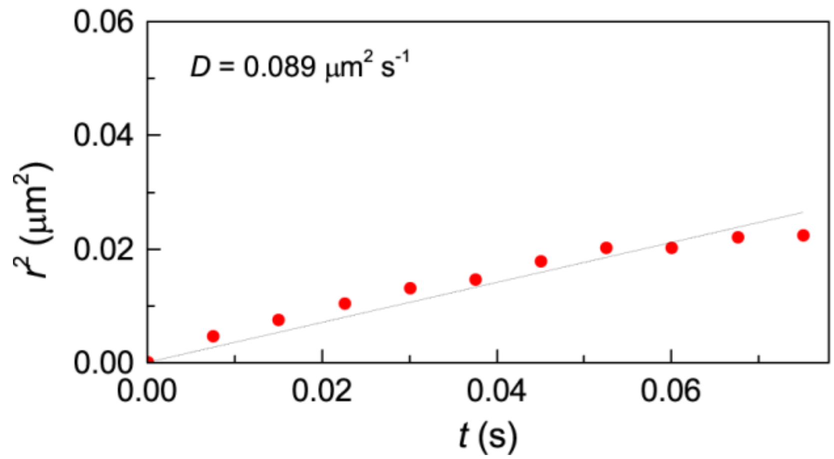




**Figure S1**. (top) Experimentally obtained cumulative distribution functions (CDFs, $i\Delta t$ = 7.5 –75 ms) in the form of 1-P (solid lines) for **2a**+**2b**. Dashed lines show fittings with Eq. 2. (bottom) CDF coefficients at different time lags determined by the single Gaussian distribution model using Eq. 2. The solid line shows a linear fitting.

**Supporting references**

(1) Rubinstein, M.; Colby, R. H., *Polymer Physics.* Oxford University Press: 2003.