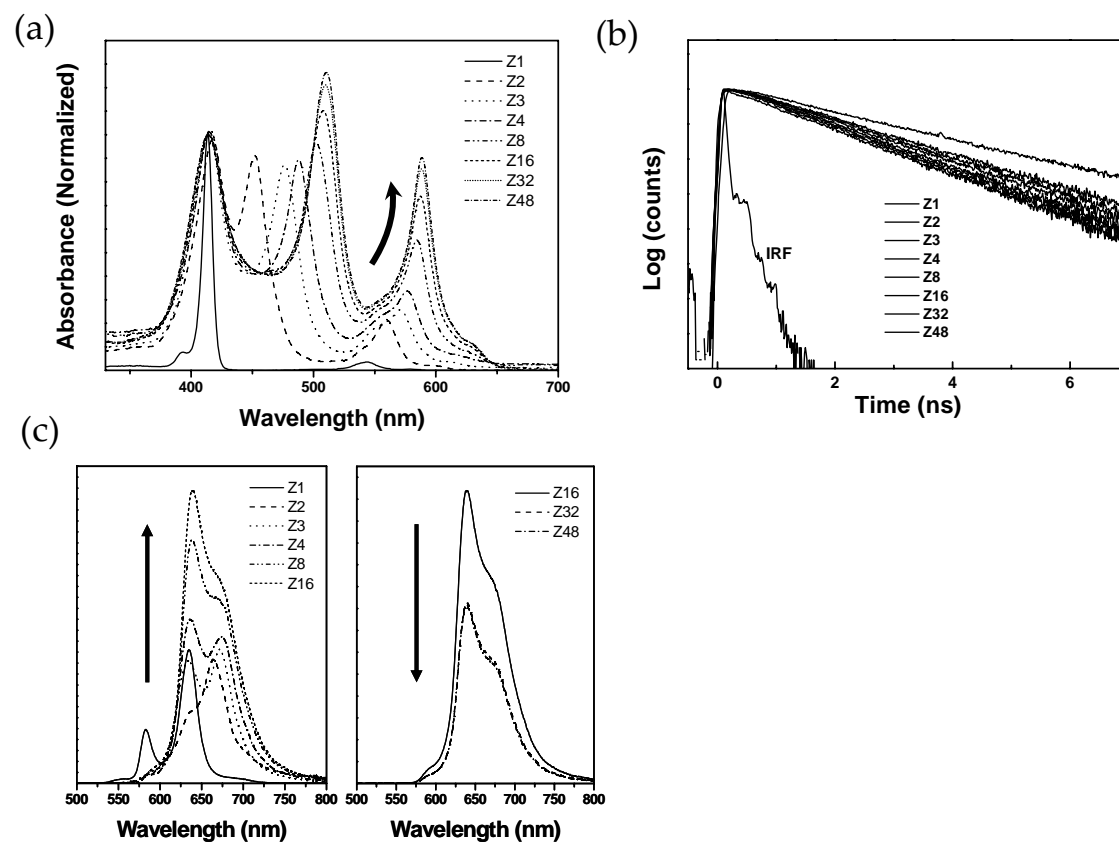
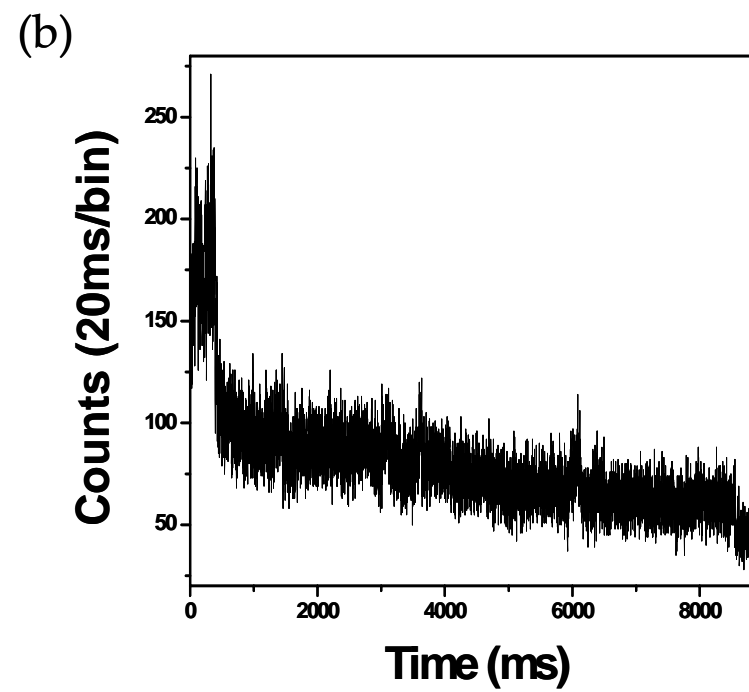
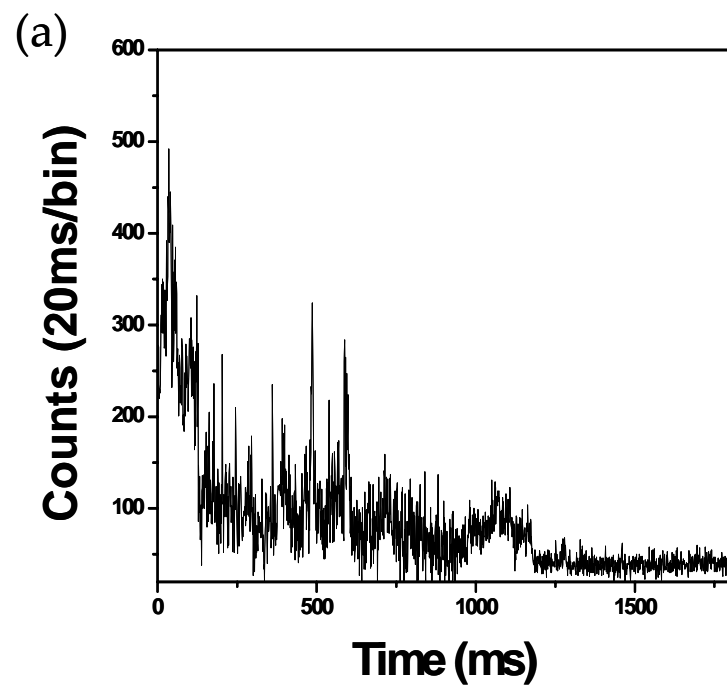


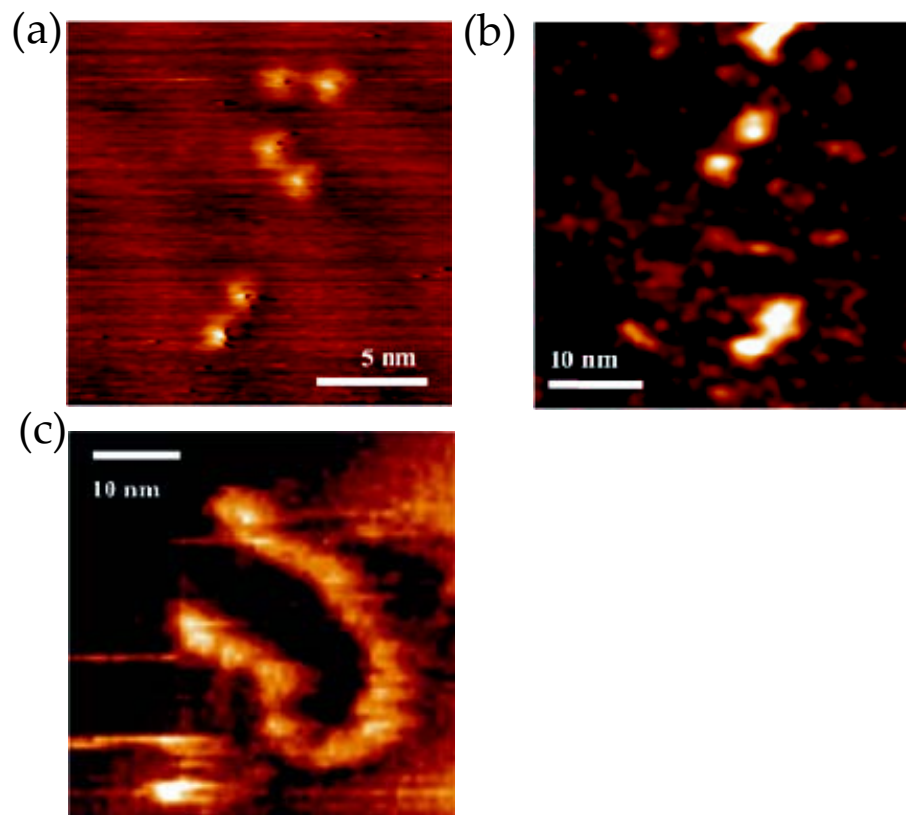
Supporting Information 1. Fluorescence images of **Z8** embedded in a PMMA polymer matrix at atmospheric condition



Supporting Information 2. Steady-state absorption (a) and fluorescence spectra (b) of **Z1~Z48** porphyrin arrays in THF. The fluorescence decay curves of **Z1~Z48** porphyrin arrays in THF probed by TCSPC (c)



Supporting Information 3. The fluorescence intensity trajectories of **Z32** with large (a) and small (b) fluctuations.



Supporting Information 4. The STM images of **Z6** (a), **Z9** (b), **Z48** (c). **Z6** shows a pair of images that are nearly constantly spaced at a distance of 55 Å. As bright images usually come from strong adsorption of π -conjugated molecules on a metal surface, the bright pair-based images obtained here may be assigned to the adsorption of the two end porphyrins with their planes parallel to the metal substrate. **Z9**, being similar to **Z6**, seems to take a bent conformation with the porphyrin intermediates between the two end porphyrins being detached from the metal surface. This assignment suggests conformational flexibility of **Zn**, which is highlighted in **Z48**. The STM image of **Z48** displays a severely bent structure on the metal surface. Importantly, the molecular length of **Z48** is estimated to be 43.5 nm from this STM image, which is exactly its predicted value.