

YOSHIE LAB.

[Materials developed by using polymer dynamics]

Integrated Research Center for Sustainable Energy and Materials

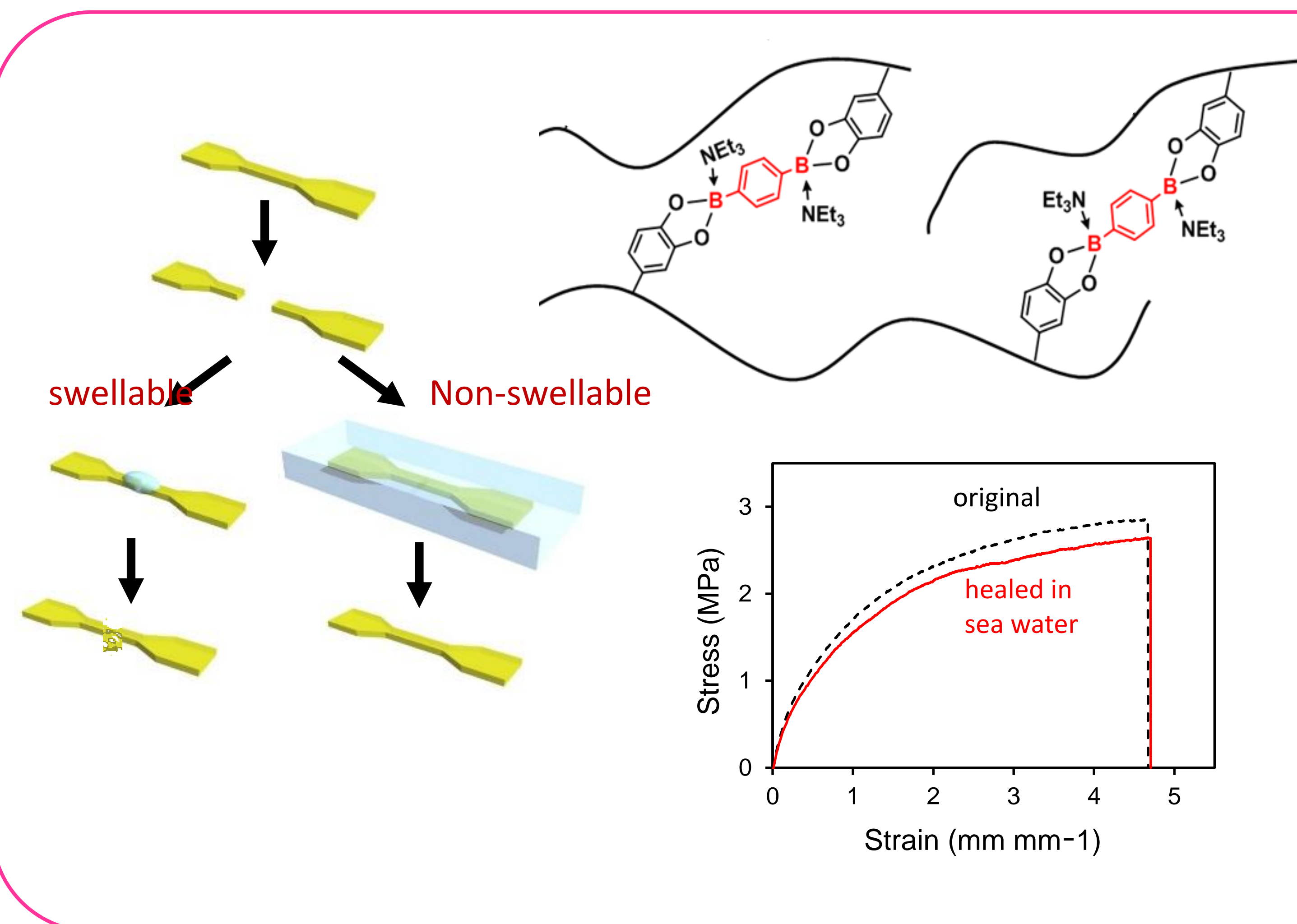
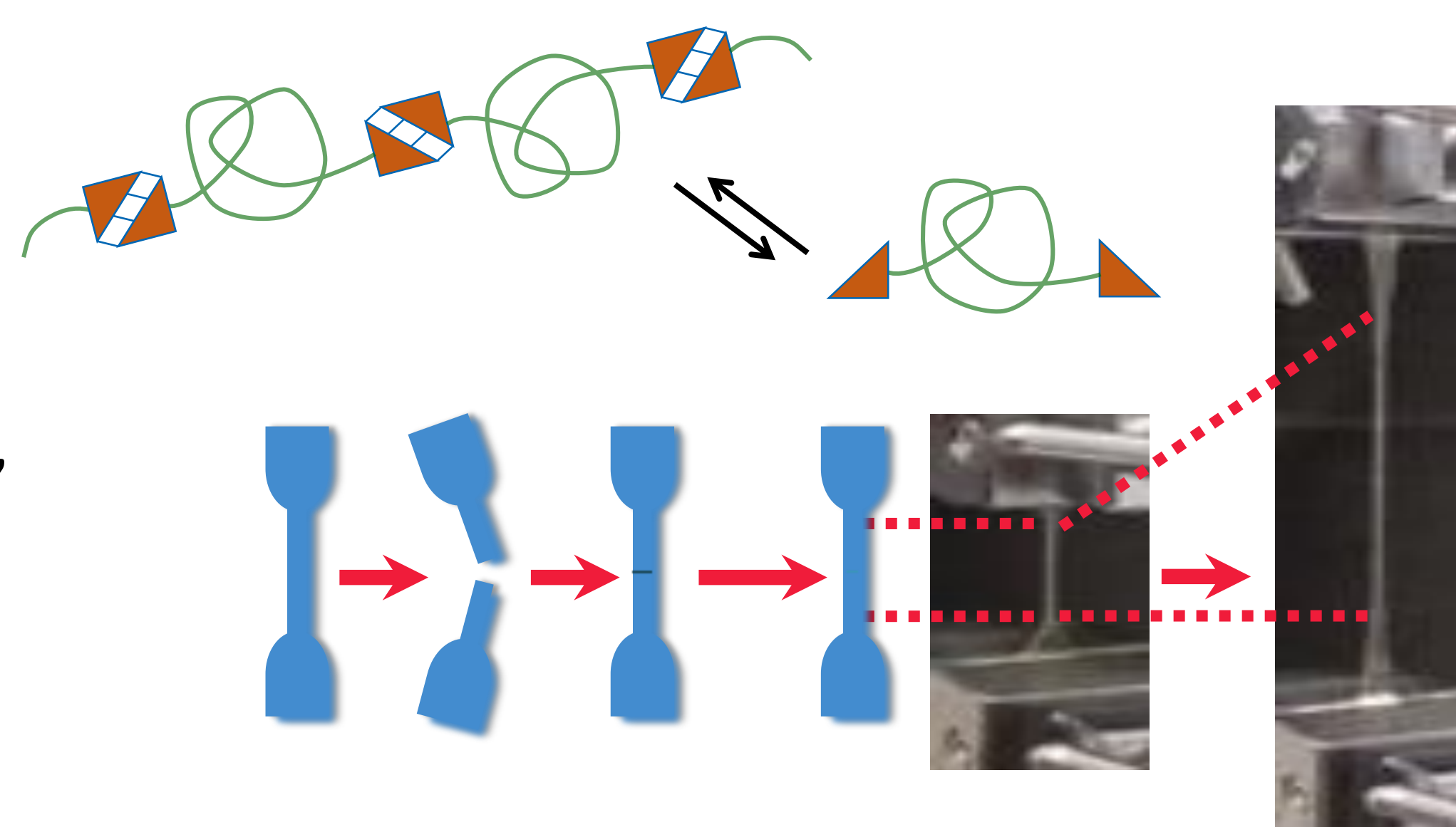
Polymeric and Environmentally Conscious Materials

Department of Chemistry and Biotechnology

<http://yoshielab.iis.u-tokyo.ac.jp/top.htm>

Polymers with Dynamic Bonds

Polymers with novel environmental functions are developed by using dynamic bonds such as reversible covalent bonds and hydrogen bonds. Through dynamic controls of the polymer multi-level structures, various polymers with novel functionalities such as hard/soft conversion, self-healing, tough elastomers and shape memory.



Much focus has been taken into polymers healed by ubiquitous stimuli. They include polymers healed with the assistance of water swelling of the damaged area. However, such polymers often suffer from swelling-induced mechanical instability. Recently, we have developed a non-swellable polymer that can heal under seawater. Dynamic crosslinking of catechol functionalized polymers with *p*-phenyldiboronic acid through non-ionic boronate ester bonds is the key to realizing these two properties simultaneously.

Nano-ordered Patterns by Polymer Blends

We successfully obtained a long-range ordered nanoscopic lamellar morphology in polymer blends. Solidification, directional phase separation and structural freezing in the blends are induced instantaneously by solvent crystallization. This method using polymer blends instead of block copolymers may serve as a low-cost facile way to produce nanoscale lamellar orientation in thin films.

