

'Smart' Polymer Technologies for Global Health

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Our research group is interested in developing 'smart' biotechnologies using stimuli-responsive (or smart) polymers that respond to small changes in external stimuli (e.g., temperature [1], pH, chemicals, ionic strength, electric field, or magnetic field) with large discontinuous changes in their physical properties (e.g., shape [2], surface characteristics [3], solubility or a sol-gel transition). Due to the ability to receive signals and act as switches without the requirement of external power sources, development of smart polymer-based technologies will promise to impact medical treatment in multiple ways, providing health delivery services and new options for conventional therapies, particularly in the resource-limited environments and low-infrastructure sites such as developing world. I will talk about recent advances in smart polymer-based biomedical technologies, especially for global health, which make it possible to develop point-of-care diagnostics or systems with accurate 'on-off' switching to display their highly desirable properties without the requirement of an external power supply [4,5].

- [1] Y.-J. Kim, M. Ebara, T. Aoyagi, *Angew. Chem. Intl. Ed.*, **51**, 10537-10541 (2012).
- [2] M. Ebara, K. Uto, N. Idota, J. M. Hoffman, T. Aoyagi, *Adv. Mater.*, **24**, 273-278 (2012).
- [3] M. Ebara, M. Yamato, T. Aoyagi, A. Kikuchi, K. Sakai, T. Okano, *Adv. Mater.*, **20**, 3034-3038 (2008).
- [5] M. Ebara, J. M. Hoffman, A. S. Hoffman, P. S. Stayton, *Lab Chip*, **6**, 843-848 (2006).
- [4] M. Ebara, J. M. Hoffman, A. S. Hoffman, P. S. Stayton, J. J. Lai, *Langmuir*, *in press*.