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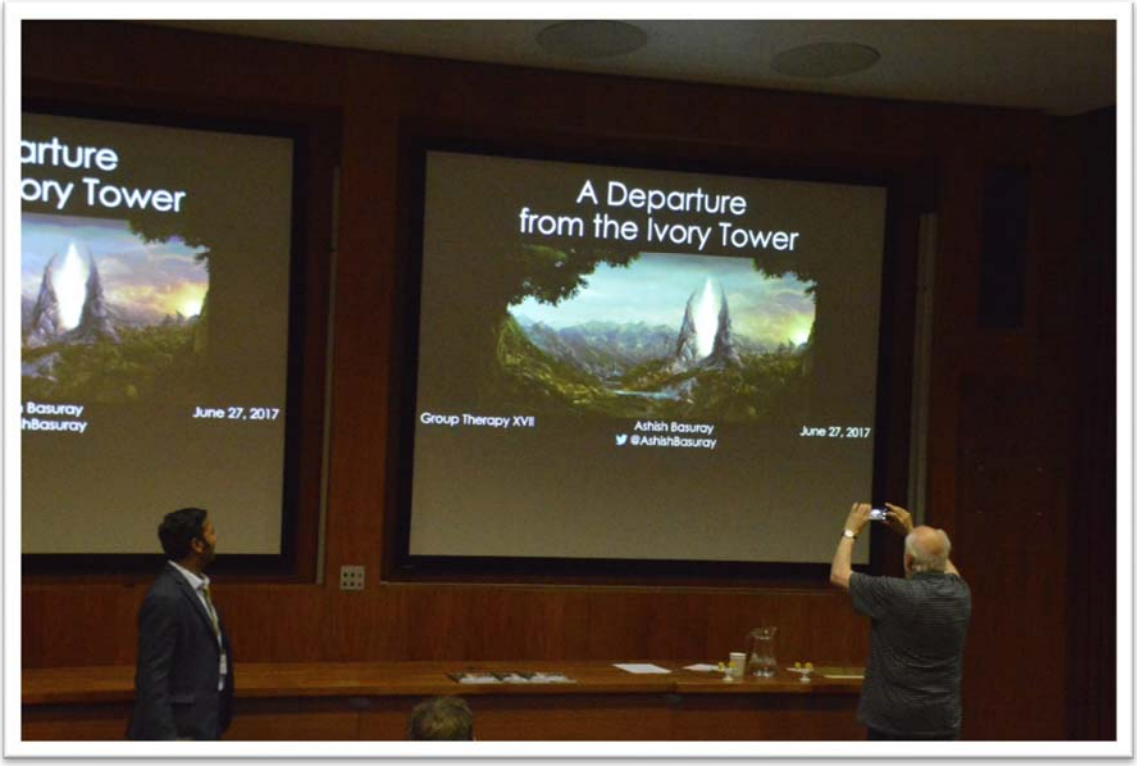

A Golden Age for Chemistry – A Tribute to Prof. J. Fraser Stoddart

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On June 25–28, I attended a symposium called “A Golden Age for Chemistry” hosted by the Stoddart group at Nottingham University. The symposium was held to celebrate Prof. J. Fraser Stoddart’s Nobel Prize for Chemistry, the 50th anniversary of the Stoddart group, and Prof. Stoddart’s 75th birthday.

The first time I met Prof. Stoddart was in 2007, when I attended a previous “A Golden Age for Chemistry” symposium held at Edinburgh University. At that time, a number of supramolecular chemists and former members of the Stoddart group gathered to celebrate his 65th birthday. Prof. Makoto Fujita, my doctoral supervisor, brought several students, including me. At that time, Prof. Stoddart was already well known in the field of supramolecular chemistry, as he had established a facile methodology to build unprecedented interlocked structures, namely rotaxanes and catenanes, and their various applications including molecular switches and devices. At the conference, I was deeply impacted by the beautiful structures and elaborate functions presented by frontier supramolecular chemists. In 2011, after I got my Ph.D. in the Fujita group, I started my postdoctoral career in the Stoddart group at Northwestern University.[1] I spent a year and a half as a JSPS research fellow, mainly studying redox switchable catenated complexes by virtue of synergetic action of metal coordination and charge transfer interactions.[2] Excellent young chemists joined the group from all over the world—the UK, France, Italy, Switzerland, Turkey, Australia, China, and Saudi Arabia—and lab life with them afforded not only fruitful scientific discussion, but also cultural communications.

More than 100 people attended the 4-day symposium this year, where nearly 60 former members of the Stoddart group gave exciting and funny talks on their own majors and past memories in the group. While several authoritative professors including Prof. D. Leigh (Manchester University)[3] and Prof. L. Cronin (Glasgow University)[4] attended, most of those present were young professors or industrial researchers who had just started their careers. I met a number of my former colleagues from Northwestern University who are now working as young assistant professors worldwide.

Reflecting the wide spectrum of scientific interests in the Stoddart group, the talks by the graduates covered a wide range of fields, and were filled with sophisticated chemistry (Figure 1). Prof. Leigh presented elegant one-way molecular motors realizing Maxwell’s demon in molecular form, which is a chemical system away from equilibrium. Dr. H.-P. Jacquot de Rouville (Paris University), who had been one of my best colleagues at Northwestern, talked about structural switching of viologen-based molecular systems aiming at molecular devices driven by the redox reaction of the viologen. The construction of viologen-based molecular systems and their redox control was a fundamental idea in the Stoddart group. Prof. L. Fang (Texas A&M University)[5] spoke about the synthesis and properties of coplanar conjugated organic polymers, such as an infinitely fused polyaromatic hydrocarbon via a ring-closing olefin metathesis reaction. Prof. F. H. Kohnke (Messina University)[6] presented a calixpyrrole-based anticancer drug delivery system (DDS), where the polynitrogen macrocycle effectively recognizes a target DNA molecule to allow an accompanying anticancer Pt complex to destroy the DNA duplex. Prof. J. Gassensmith (Texas University Dallas)[7] and Prof. R. Forgan (Glasgow University),[8] also my colleagues at Northwestern University, talked about the development of DDS utilizing functionalized metal organic frameworks (MOFs) as a drug carrier. Controlling the surface properties of the MOFs, including water solubility and target selectivity, plays a key role to achieve an efficient DDS. Prof. C. Ke (Dartmouth University)[9] presented a novel polyrotaxane-based soft material that can be prepared using a 3D printer. Densely packed “ring” molecules aligned on the “thread” molecule give considerable rigidity to the polymer chain, where local

crystallization of the rigidified chains acts as noncovalent crosslinking between the polymer threads.

Figure 1. A picture of the symposium (right: Prof. Stoddart).

Figure 2. A picture of the dinner party.

During the lunch break and the dinner party, plenty of fruitful scientific communications and discussions emerged actively (Figure 2). I introduced the ROD business, XtaLAB Synergy and CrysAlis^{Pro}, to the attendees familiar with single crystal X-ray diffraction by showing a demo movie. As most supramolecular researchers study polymeric materials, small angle diffractions and thin film analyses have been extensively utilized. On the other hand, single crystal X-ray diffraction was not regarded as a main analytical technique in this field.

I deeply appreciate Sir Fraser Stoddart for introducing me to the wonderful world of supramolecular chemistry, and for inviting me to such a nice symposium with the excellent Stoddart family.

[1] http://stoddart.northwestern.edu/

[2] M. Frasconi, T. Kikuchi, D. Cao, Y. Wu, S. M. Dyar, W.-G. Liu, G. Barin, A. A. Sarjeant, R. Carmieli, C. Wang, M. R. Wasielewski, W. A. Goddard III, J. F. Stoddart, *J. Am. Chem. Soc.* **2014**, *136*, 11011–11026.

[3] http://www.catenane.net/

[4] http://www.chem.gla.ac.uk/cronin/

[5] http://www.chem.tamu.edu/rgroup/fang/

[6] http://www.unime.it/it/persona/franz-heinrich-kohnke

[7] https://labs.utdallas.edu/gassensmith/

[8] http://www.chem.gla.ac.uk/staff/rosfor/

[9] http://www.keresearchgroup.com/