**Transcript**

***Dr Adam Mechler – Chemistry of self assembled systems from soap bubbles to cell membranes***

My research is about self assembly, the chemistry of self assembly. Nature is full of processes where small molecules come together and decide to aggregate and form relatively large structures that are actually mechanically rather strong. And, well what I am interested in really to find out why and how is it happening. Now, to give an example, I guess what self assembled systems might be, think of a soap bubble. Soap bubble is really just a huge bubble that is a very, very thin layer of water that is enclosed between surface active materials and these have a water loving and a water hating end and the water hating end is sticking out like that and they have the water in between. Now, cell membranes are similar. Cell membranes are also self assembled systems that come together from same kind of surfactant molecules only these ones are lipids. These are not the same lipids that we talk about when we talk about obesity. These would come together with the water hating part and then form these bi-layer that is mechanically so strong that it can keep all the internals of the cell inside including even small ions and that fascinates me. That’s what I try to understand.

Well, primarily I want to describe what gives the mechanical strength to these biological membranes and how do they react to changes in their environment, changes in the ions around them, or changes in terms of the protein environment. Well, there are all these small molecule venoms coming from insects, for example, when you are stung by a bee it hurts because there are small peptides tearing membranes apart in your skin. I want to understand that as well. How would these small molecules interact with the membranes? How would breach their integrity? How would we break them up? And, how could we potentially use that to kill bacteria?

Technological breakthroughs quite often come from research that was not related to the actual application, so the aim of the research is quite often just to understand, to describe nature and then provide the platform, provide the basis for other people or the same people to develop further applications. So, in terms of my research what applications there might be? Well, we can build artificial membranes, we can coat, for example, implants with them and stop rejection which is a big program for medicine. Or we could coat small intracorporous devices such as surgical microbe submarines that people actually seriously think about nowadays. Or, we can just coat drugs and deliver them locally. That’s all possible. But, whether that will be the breakthrough application for this problem, it would be hard to say.