

## Self-healing fabric

The inspiration for many of self-healing materials already developed come from the process of blood clotting, tissue and bone regeneration. However, incorporating the same route into engineering materials become a challenge due to the complex of the healing process.

Since the beginning of the design process, we have explored some alternatives. Some of the design strategies to approach the self-healing connotation are the release of healing agent, reversible cross-links and electrohydrodynamics.

The initial approach involved the use of Squid Ring Teeth Proteins (SRT) covering with a film a textile conferring toughness and elasticity. Due to the construction of a self-healing multilayer films (Figure 1). As the way this process was designed falls into the category of the release of the healing agent because the self-healing compound (SRT and polystyrenesulfonate) would be encapsulated until the fabric is broken and then the healing agent is release (Figure 2). This encapsulation has the double function of isolate and enclose the agent and protects it from the exterior environment.

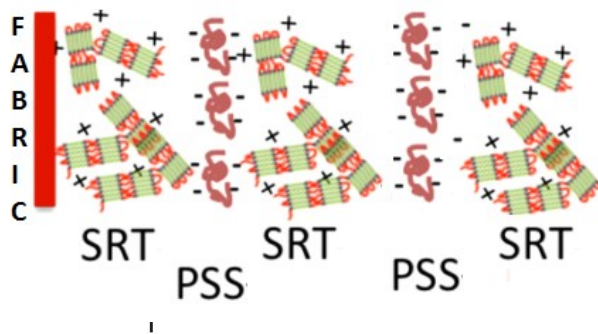


Fig. 1. Self-healing multilayer.  
Modified from Gaddes, *et al.*, 2016.

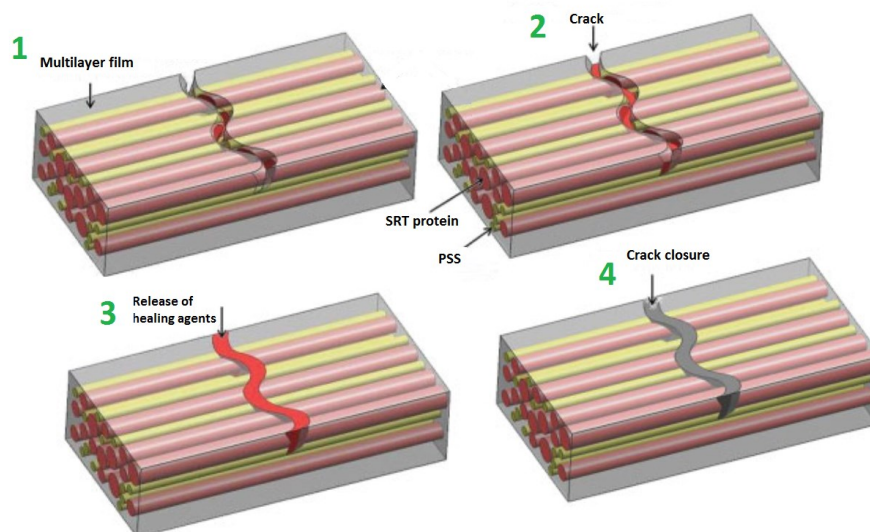
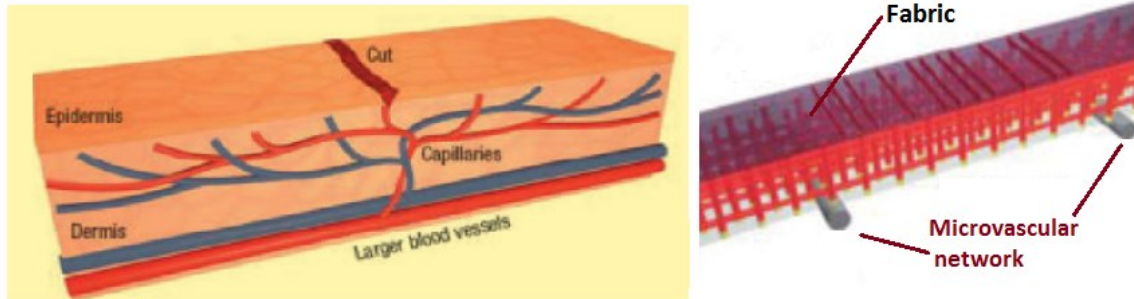


Figure 2. Schematic representation of self-healing process.  
Modified from Kumar, 2009.

According to the definition of self-healing as the ability of heal any imperfection in an autonomously way then became evident the necessity of having a living material. The idea of having a living material that is growing and regenerating itself appeal to us and the members of my team had propose the use of some cultures that will serve as a fabric. Furthermore the technical difficulties of the microcapsule self-healing approach led us to think to mimic the vascular system of a leaf or the skin. The use of a

centralized microvascular network that helps to distribute the system that will have the properties of growing and self-heal. And equally important the substance to support the system.

The 3D networks t will allow the connectivity and the distribution through all the tissue-fabric (Figure 3). Also, this mechanism will allow the person who is using this second skin to put a scaffold that the tissue can follow and take the shape of it.



**Fig. 3.** Mimetic model of the skin applied into microvascular network.  
Modified from Kumar, 2009.

The idea of self-repairing has the potential to use it to overcome the ideals of produce more reliable and durable materials. Exploring the idea of durable materials, especially in the fashion industry the idea of evolving and change at the same time as the person who is using it is an eye-catching idea. All these ideas involve the use of genetically modified organism in our day-to-day life and feed them and evolve with them as part of a more synthetic-life society; which is how we imagine the future civilisation. Hopefully, this future entails the evolution of the technology in where using this GMOs will be cheaper, sustainable and accessible than other sources. Also, helping to this future civilisation to be more conscious of its environmental footprint and responsible for the use of the resources.

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