**Bacterial biosensor *E.coli* DPD2794 in the search for UV photo protective substances**

**Jenni Tienaho 1,2, Emmi Poikulainen 1, Tytti Sarjala 2, Ville Santala 1, Matti Karp 1**

1 Laboratory of Chemistry and Bioengineering, Tampere University of Technology, Korkeakoulunkatu 8, FI-33101 Tampere, Finland

2 Natural Resources Institute Finland (Luke), Latokartanonkaari 9, FI-00790 Helsinki, Finland

Chemical sunscreens are usually synthetic aromatic compounds conjugated with a carbonyl group. They protect from the damaging effect of UV radiation by absorbing UV light and releasing lower energy rays. However, UV absorption can activate the sunscreens and they may, thus, interact with cutaneous molecules, causing adverse skin reactions, such as dermatitis or photosensitivity reactions. Chemical sunscreens have also been shown to possess adverse environmental impacts. For example, oxybenzone was found to be genotoxic towards coral planulae. Sunscreen components also induce coral bleaching by promotion of viral infections to hard coral and their symbiotic algae. These factors indicate an urgent need for broad-spectrum anti-UV radiation compounds derived from natural sources for the use of dermatology, cosmetics and the coating industry.

We have developed a method to screen for the UV protection capacity using bacterial whole-cell biosensor *E.coli* DPD2794 (*recA’::lux*). The method has been optimized to gain reproducible and dose dependent results using control substances and known UV shields with only 30 seconds of UV radiation exposure. With this methodology, we can detect both the bioactive shielding and the absorption capacity of the samples in a 96-well format. The developed microplate technique also requires minimal time-consuming pre-handling and the luminescent light signal can be monitored continuously and in real-time. This methodology also embodies HTS potential and can be used for the rapid screening of photo protective substances from a vast amount of nature-based sample material. The materials tested include for example *Sphagnum* mosses and compounds from conifer bark and needles. This method enables the screening of materials from nature to replace the synthetic chemicals of sunscreens with sustainable and renewable options.