

## FULLERENE NANOFORMULATIONS

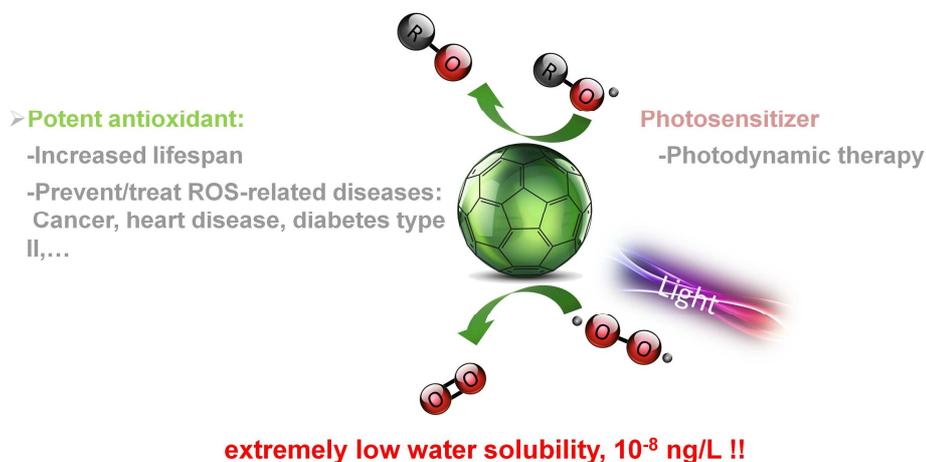
We are seeking partners interested in water-soluble fullerene formulations for their use as antioxidant or as photosensitizer.

### INTRODUCTION

Fullerenes are of particular interest for biomedical and cosmetic purposes because of their powerful antioxidant and photosensitizer properties. However, their extremely low water solubility limits their bioavailability. The water solubility can be increased by chemical modification, which, however, provides poor control of regioselectivity and could lead to the loss of the intrinsic properties of fullerene and change the toxicology profile. Therefore a supramolecular approach has been developed to solve the issue and to maintain the intrinsic properties of the fullerenes.

### TECHNOLOGY

Researchers at Ghent University in the research group of Prof. Richard Hoogenboom have developed a simple, green approach to produce water-soluble fullerene formulations through complexation with water soluble biocompatible polymers such as poly(ethylene glycol), poly(*N*-vinylpyrrolidone) and poly(2-oxazoline)s.



### :Our Solution :



Potential applications of Fullerenes as 1) an antioxidant or 2) a photosensitizer, however these are inhibited by its low watersolubility. The lower part of the figure illustrates our approach to increase the bioavailability of fullerenes.

### APPLICATIONS

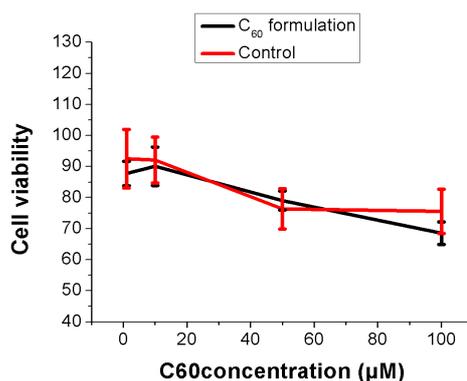
The technology could mainly be used in areas where antioxidants can provide their beneficial effects, ranging from fields such as food preservatives and anti-ageing, to medicine where it could potentially prevent or treat the presence of reactive oxygen species that are related to diseases like cancers, diabetes and Alzheimer's.

## ADVANTAGES

- The nanoformulations can be produced in a fast, green and solvent free manner, therefore eliminating the need for tedious purifications
- Different types of polymers can be used for the complexation, allowing the incorporation of other functional groups (*e.g.* targeting moieties, fluorescent labels)
- A relatively high content of fullerenes are incorporated into the nanoformulations up to 10 weight per cent
- The provided nanoformulations are stable for extended periods (months) of time in aqueous solutions

## STATUS OF DEVELOPMENT

Proof of concept for the complexation and preparation of stable fullerene nanoparticles with different sizes (50-200 nm) has been delivered. Currently we are further investigating the influence of the process parameters on the obtained nanoparticles and starting the biological evaluation. A first cytotoxicity assay has been performed indicating the non-toxic nature of the fullerene nanoformulations.



MTT-assay on RAW 264.7 macrophages of a C<sub>60</sub>-Poly(2-oxazoline) formulation.

## PARTNERSHIP

We are interested in collaborations/partnerships to further explore the potential of our fullerene formulations for treatment of or for slowing the onset of several degenerative diseases. We can offer water soluble fullerene solutions.

## REFERENCES

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## KEYWORDS

Fullerene, nanoformulation, biocompatible polymers, ROS-induced diseases, antioxidant, photosensitizer

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