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Innovation Award

Novel SiO_2-based antioxidant compound with significantly extended life-time and activity

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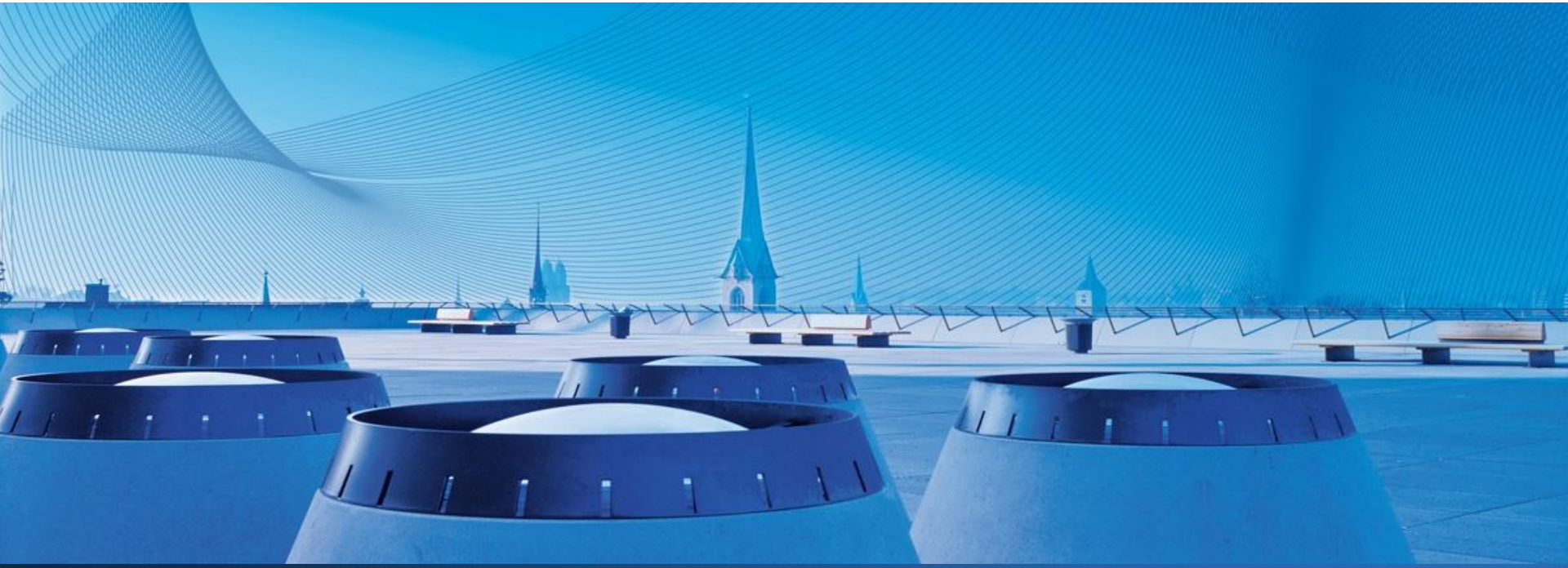
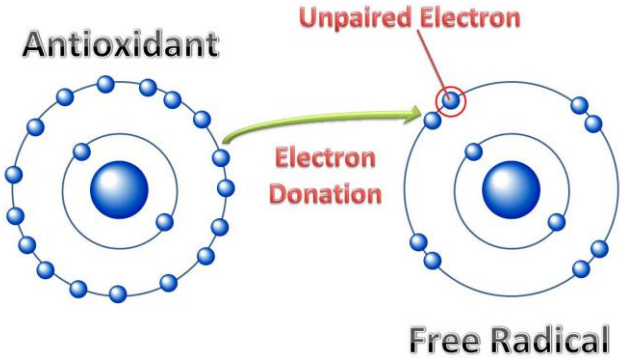
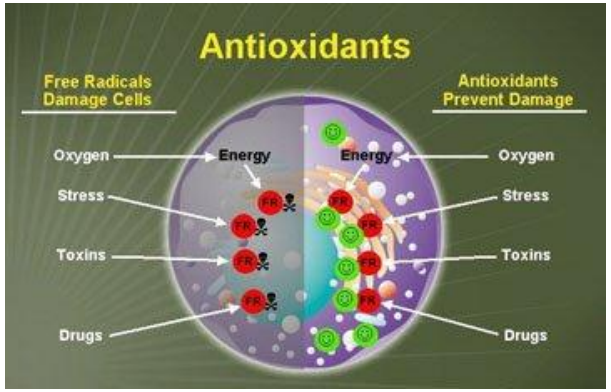
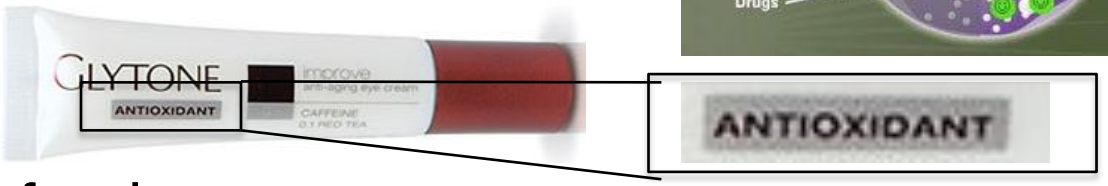


Antioxidants: What are they?



- Compounds that inhibits oxidation of molecules
  - Donate electron to *free radicals*
- So why is that important?
  - Free radicals are responsible for:
    - Diseases
    - Premature aging, Bad skin
- Applications:
  - Cosmetics
  - Nutrition and food
    - Prevents oxidation
    - Offers anti-radical activity
  - Polymer industry





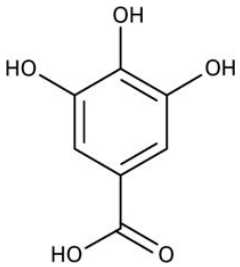
Current antioxidants

- Phenols are potent antioxidants
- Gallic acid: highest
- Problem: polymerization
  - Loses activity
  - Coloristic changes
- Can we prevent that?

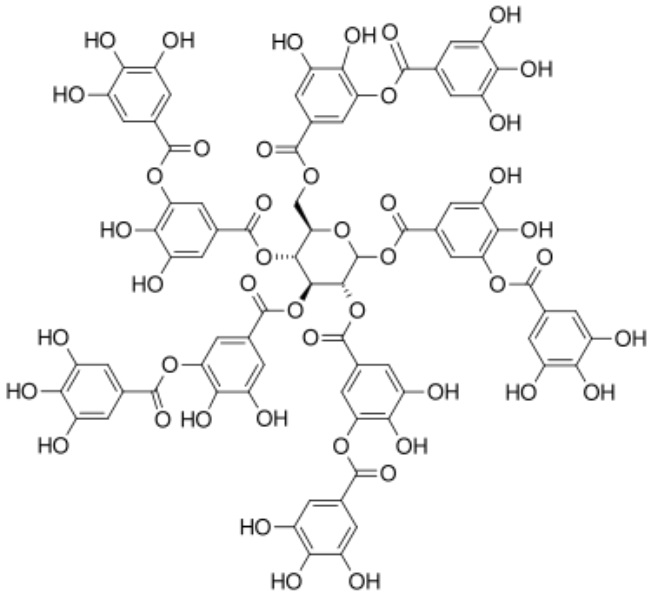
Antioxidant amount to reduce the radicals by 50% (lower = better)

Compound	EC_{50} (10^{-6} M)
Phenolic acids	
Gallic acid	5.1 ± 0.1
Protocatechuic acid	11.1 ± 0.0
Gentisic acid	7.6 ± 0.2
Siringic acid	12.3 ± 0.0
Caffeic acid	12.1 ± 0.2
Caftaric acid	20.4 ± 0.4

gallic acid

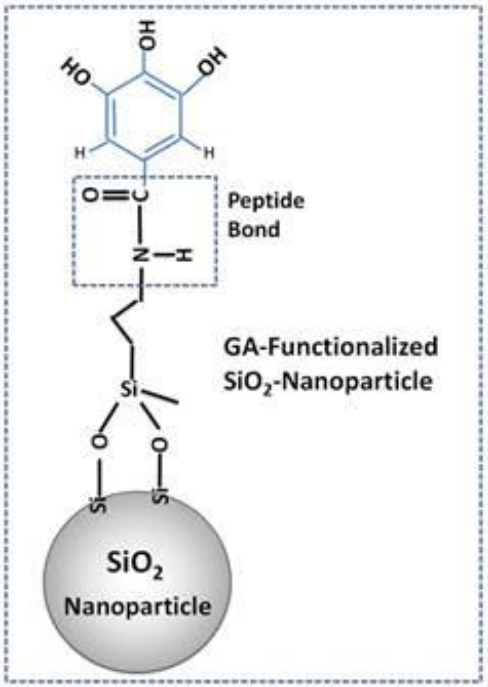


tannic acid

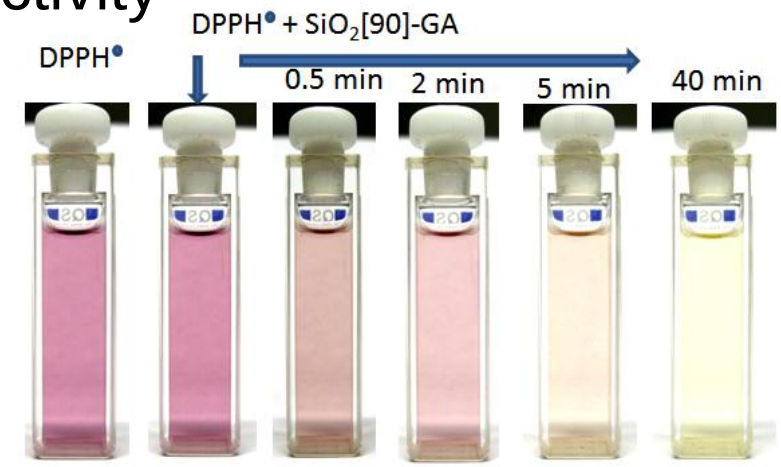


Villano, Fernandez-Pachon, Moya, Troncosco, Garcia-Parilla. *Talanta* 71, 230 (2007).

Gallic acid grafting on SiO_2 nanoparticles



- Composition:
  - SiO_2 (FDA approved) – E551
  - Gallic acid (FDA approved)
    - E310 Propyl gallate
    - E311 Octyl gallate
    - E312 Dodecyl gallate
- Covalent grafting = stability
- No coloristic change
- Antioxidant activity



Protection & Value of the Innovation

- European Patent filed (ETH Zurich, EP 12007181.0)
- Market size
  - **Cosmetics** World: US$ 170 billion (2007, source, Frost&Sullivan)
  - **Nutrition-Food** Europe: € 917 billion, (source: European Commissison)
  - **Polymers** World: US$ 454 billion (2011, source: Lucintel)
- What are we looking for?
  - We are looking for collaboration and/or licensing partners to bring the technology to the market
- Booth No. 1221 – Visit us!
- Publication
  - Y. Deligiannakis, G. A. Sotiriou, S. E. Pratsinis, "Antioxidant and Antiradical SiO_2 Nanoparticles Covalently Functionalized with Gallic Acid", *ACS Applied Materials & Interfaces*, Vol. 4,Issue 12, 6609-6617 (2012).

Thank you for your attention!

Contact Info

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