

Smart Wound monitoring Restorative Dressings (SWORD)

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Wounds:

Acute vs Chronic



“Until you marry,
it'll be healed”



- Does not heal for >3 months
- Large area affected
- Produces fluid, odour & pain
- Possibility of infection / sepsis
- Expensive to treat...



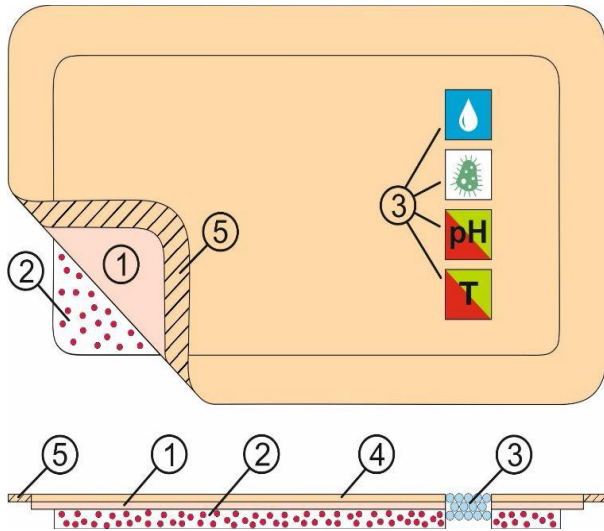
Why pursue this subject?

1 to 2 % of population will experience a chronic wound during their lifetime.

Ireland: the national prevalence rate of wounds is about 4.47% (over 200k persons) and the total healthcare costs for this condition alone amounts to nearly €800 million, i.e. 6% of total Irish public health expenditure € 13.1 billion.



The “smart dressing” concept

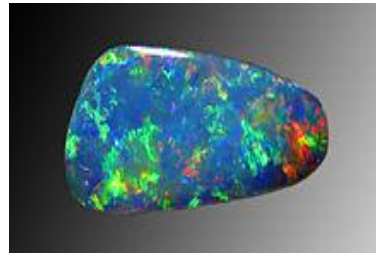


1. Low adherent chitosan-based layer for prevention of bacterial invasion
2. Highly absorbent non-woven fabrics containing slow-release drug reservoirs; serves as a drainage of wound exudate and controls water evaporation
3. Photonic crystals-based sensors (moisture/humidity, bacteria, pH and temperature)
4. Smooth, flexible cover layer, which is highly breathable, conformable with 1., protects wound bed against water and bacteria and supports 3.
5. Adhesive perimeter strip

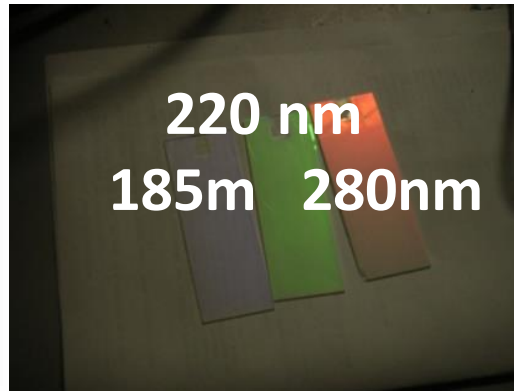
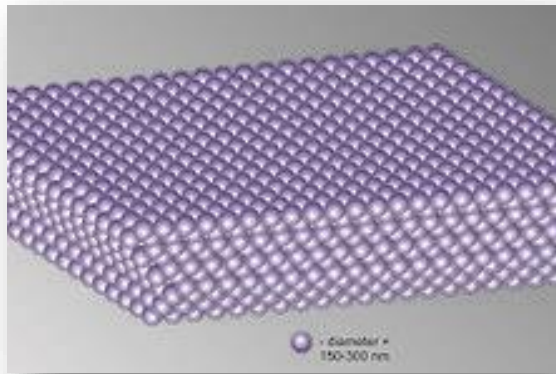
cheap – easily readable (colorimetric) – user-friendly

Sensors: Photonic crystals in a chitosan matrix

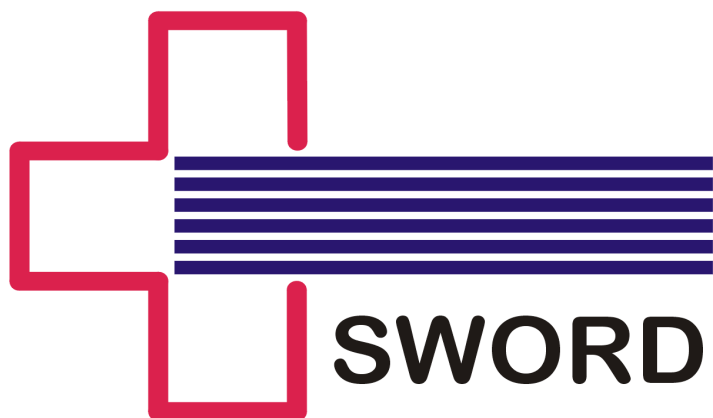
We used our expertise in photonic crystals (periodic optical nanostructures that affect the motion of photons and produce **structural colours** in order to produce **colorimetric** sensing structures (humidity, temperature, pH and presence of bacteria).



Photonic crystals in Nature



Artificial opals made of monodisperse SiO₂ particles



EU H2020 project will make use of research in **Photonic crystals** and **chitosan** and involve Tyndall National Institute and 2 UCC departments as well as 4 foreign partners

The project will

- meet a well-established need, because chronic wounds present a specific cause for concern in an aging society
- present an opportunity for an established dressing manufacturer to bring to the market a new product

It will also

- advance basic knowledge in the area of nano-materials
- show emerging trends in chronic wound treatment
- bring improved career options for participating researchers