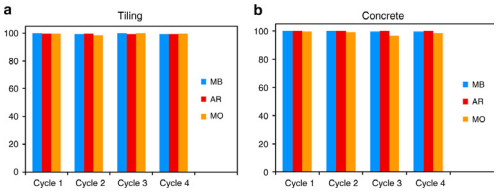
AIR AND WATER DEPOLLUTION IN CIVIL ENGINEERING

A new method of ZnO nanowires growth for water and/or air depollution by photocatalysis applied on civil engineering materials.

ERGANEO
L'AVENIR EST FAIT D'AUDACE

PRESENTATION

The invention presents a direct growth method of ZnO nanowires on civil engineering elements intended for photocatalysis for water and/or air depollution. Due to their high surface-to-volume ratio, ZnO nanowires showed excellent efficiency in the decomposition of tested dyes (AR14, MB, and MO) into less harmful products such as CO_2, H_2O, NO^{3-}, or SO_4^{2-} via a photocatalytic-induced mineralization process.
The civil engineering element coated with ZnO nanowires on its rough surface produced with this method can be integrated for instance in the development of the 5th-generation (5G) road, public garden, or in new buildings/houses.
Smartly designed with new and possibly bio-based materials, 5th generation plans to make smarter roads in the near future will integrate numerous technologies including an environment depollution function. The photocatalysis process is a promising emerging solution for this aim, as it is a cheap and fast solution to degrade toxic organic compounds into harmless products. With the present invention, the photocatalysis process can be incorporated into our everyday life. Thus, incorporating metal oxide semiconductors (photocatalysts) onto civil engineering materials is a smart way to achieve this goal, as they are known to perform photocatalysis under ultraviolet lighting, or even under visible lighting with doped photocatalysts.



Photocatalysis - Environment - Air pollution control
Water purification - Semi-conductor - ZnO
Hydrothermal method - Iron doping

APPLICATIONS

- VOC degradation
- Purification of polluted water on the road surface and reduction of soil contamination
- Self-cleaning of floors and walls

COMPETITIVE ADVANTAGES

- Directly grown nanocrystals with a structure firmly attached to the surface, no release of nanoparticles
- Better photocatalysis efficiency than nanoparticle incorporation or painting
- Proven photodegradation of TiO2, certain dyes and VOCs
- Direct and rapid growth, by an industrializable process, proven on different civil engineering materials
- Biocompatible and non-toxic material

INTELLECTUAL PROPERTY

International patent application PCT/ EP2019/078465

PUBLICATIONS

Direct growth of ZnO nanowires on civil engineering materials: smart materials for supported photodegradation, M. Le Pivert, R. Poupart, M. Capochichi-Gnambodoe, N. Martin & Y. Leprince-Wang, Microsyst Nanoeng 5, 57 (2019).

CONTACT

+33 (0)1 44 23 21 50
industriels@erganeo.com
Ref. project : 531

DEVELOPMENT PHASE

- ☑ Proof of concept on several civil engineering materials and several pollutants