# SCIENCE ET SUBFRCE

## Application note n° 66

Photocatalytic TiO<sub>2</sub>-based coating on flexible materials for building applications - 1

**Subject:** Physico-chemical characterization of composite materials with photocatalytic properties (textiles and paper) and correlation with photocatalytic tests

### **Techniques: SEM-EDS, XPS, ToF-SIMS**

- ✓ Morphology and chemical composition of the surface
- ✓ Correlation of surface analyses with photocatalytic and photo-aging tests

#### Micrometric TiO<sub>2</sub>/SiO<sub>2</sub> particles **Results: Proof of concept** Sol-gel synthesis Evaporation (1 – 4 s) Interest of mesoporous silica Heat $(T_{ext} = 120 \text{ à } 350^{\circ}\text{C})$ Membranes Filter Aerosol Nanoparticles generator collector Initial sol precursors : SiO<sub>2</sub> precursors - TiO<sub>2</sub> nanoparticles - Surfactant → Mesoporous silica leads to the protection of - Solvent (Water) the coating where particles are included without precluding the photocatalytic activity **Surface characterization** Integration into varnish (2.5%wt)**SEM:** particles are available at the surface Photocatalytic test Photo-ageing **SEM:** particles size from Particles in Acrylic varnish (5%wt) 100 nm to 3 µm Without SiO<sub>2</sub> 60.0 ►OH → loss of ξ 50,0 material SiO<sub>2</sub> commercial TiO2 40.0 rate of pollutant cm-1 30,0 30,0 nanoparticles leads to SiO2/TiO2 particles degradation after 20,0 10,0 protection of integration into the SiO2/TiO2 particles varnish varnish 0,0 Irradiation time (min) Irradiation time (hours)

#### **Conclusion:**

Photocatalytic activity was demonstrated and the protection of the substrates from photoactivity of TiO<sub>2</sub> is highlighted by surface characterizations and photo-ageing tests.

