NANO-CATHEDRAL develops new **nano-materials, technologies and procedures** for the conservation of deteriorated stones in monumental **buildings, cathedrals** and **high value contemporary architecture**.

### Innovation

- Innovative methods for consolidations, protection and pollutants decomposition
- A multidisciplinary approach to the development of affordable methodologies, to guarantee reliability of the whole value chain
- Sustainability since conception: LCA and LCCA drive the development

### Goals

- **Preserve the originality of the stone materials**
- **Provide high performance treatments**
- **Provide long-term conservation**

### Materials

Based on the specific decay phenomena of the selected lithotypes, several materials are selected and pre-tested

#### Consolidants

- 5 selected for further laboratory testing on selected lithotypes
- Reactivity of Nano-Particles (NPs)
- Combination of Teos with NPs
- Use of Nano-SiO₂ and Nano-ZrO₂ as consolidant
- Stabilization of Nano-Particles

#### Protectives

- 6 selected for further laboratory testing on selected lithotypes
- Photocatalitic treatments based on Nano-TiO₂
- Anti-fouling treatments using Nano-silver
- Innovative functionalized nano-structured polymer particles

### Testing

- Artificially decayed lithotype specimens for lab tests are prepared:
  - Assessment of major decay in naturally weathered states and artificial ageing procedures
  - Selection of thermic ageing cycles for each lithotype
  - Ageing of 144 stone specimens for each of the 6 selected lithotypes

### Full Program Testing:

A systematic testing program is performed for consolidant and protective treatments to select the best ones to be applied on-site

- Application of treatments on pilot areas of monuments
- Development of operational guidelines

### Contacts

**Project Coordinator**
Andrea Lazzeri
a.lazzeri@ing.unipi.it

**Project Manager**
Sara Scognamiglio
scognamiglio@warrantgroup.it

**Dissemination Manager**
Linda Brengi
lbrengi@warrantgroup.it

**Dissemination Manager**
www.nanocathedral.eu

**Partners**

**http://www.nanocathedral.eu**

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