Photocatalytic mortars for plastering applications.

IS IT:

- [X] *Product*
- [ ] *Technology*
- [ ] *Equipment*

APPLICABLE FOR:

- [ ] *Restoration*
- [X] *Rehabilitation*
- [X] *New Construction*

APPLICABLE ON:

- [ ] *1. Foundations and underground structures*
- [ ] *2. Vertical structures*
- [ ] *3. Horizontal structures and vertical connections*
- [ ] *4. Roof and terraces*
- [X] *5. Façade and building envelope*
- [X] *6. Finishes and completion elements*
- [ ] *7. Integrated services*
- [ ] *8. General strategies for building recovery*

Related companies: *No companies; university research; structural study.*

DESCRIPTION

The product is under development. Scientific research.

The product is a sustainable innovative plastering mortar made from hydraulic lime, natural siliceous sand and photocatalytic hydroxyapatite-based wastes deriving from food and canning industry. The product is compatible with historical architecture and traditional construction materials.

The product should be used for plastering applications in new constructions or building rehabilitation. It is bright white and bright shining. Color may be altered by additives.

The product is photocatalytic and contributes to combatting the atmospheric pollution and protecting structures and façades.

WHY TO USE

The product is highly sustainable, high performing, reuses a quantity of wastes in perspective of the Circular Economy.

It contributes to cleaning the atmosphere thanks to its photocatalytic features.

Furthermore, it is highly durable and resistant to environmental agents.

HOW TO USE AND APPLY

The application is analogous to that of any plastering compounds. The material, in the fresh state can be easily mixed and placed using common spatula.

The material can be furnished in the common pre-mixed plastering mortar phase.

TECHNICAL CHARACTERISTICS

The plaster contains photocatalytic hydroxyapatite-based powders, deriving from Atlantic codfish bone wastes, as additive. The material contains from 1-5 wt% TiO2 (100 to 500 ppm), two orders of magnitude less than the usual quantities. About 24 % NOx rate abatement was observed.

RECOMMENDATIONS AND OTHER INFORMATION

The material is highly thin and volatile, handle with care and wear mask; direct contact with skin, eyes, should be avoided.

The photocatalytic agent is prepared as follows: Atlantic codfish bones are treated in a Ti(SO4)2 solution for 24 h; subsequently, they are dried for about 12 hrs and calcined at 800°C. This led to a triphasic material HAp/b-TCP/TiO2, in proportion 54:45:1 wt %. The product obtained was manually milled into a fine powder. The filler is ready to be used.

EXAMPLES

No example. Research in progress.

REFERENCES / SOURCES AND LITERATURE

Saeli M., Piccirillo C., Tobaldi D.M., Binions R., Castro P.M.L., Pullar R.C., A sustainable replacement for TiO2 in photocatalyst construction materials: Hydroxyapatite-based photocatalytic additives, made from the valorisation of food wastes of marine origin, Journal of Cleaner Production 193 (2018), 115-127.

Piccirillo, C., Pintado, M.M., Castro, P.M.L,. Hydroxyapatite and calcium phosphates from marine sources: extraction and characterization. In: Kim, S.K. (Ed.), Marine Biomaterials (Characterization, Isolation and Applications). CRC- Taylor & Francis, Boca Raton, FL, USA, 2013, 29-44.

Piccirillo, C., Silva, M.F., Pullar, R.C., Braga da Cruz, I., Jorge, R., Pintado, M.M.E., Castro, P.M.L., Extraction and characterisation of apatite- and tricalcium phosphate-based materials from cod fish bones. Mater. Sci. Eng. C 33 (2013), 103-110.

Piccirillo, C., Dunnill, C.W., Pullar, R.C., Tobaldi, D.M., Labrincha, J.A., Parkin, I.P., Pintado, M.M., Castro, P.M.L. Calcium phosphate-based materials of natural origin showing photocatalytic activity. J. Mater. Chem. A 1 (2013), 6452-6461.

Piccirillo, C., Pinto, R.A., Tobaldi, D.M., Pullar, R.C., Labrincha, J.A., Pintado, M.M.E., Castro, P.M.L. Light induced antibacterial activity and photocatalytic

properties of Ag/Ag3PO4-based material of marine origin. J. Photochem. Photobiol. A 296 (2015), 40-47

WEBSITE OF THE COMPANY

N/A

IMAGES AND CAPTIONS

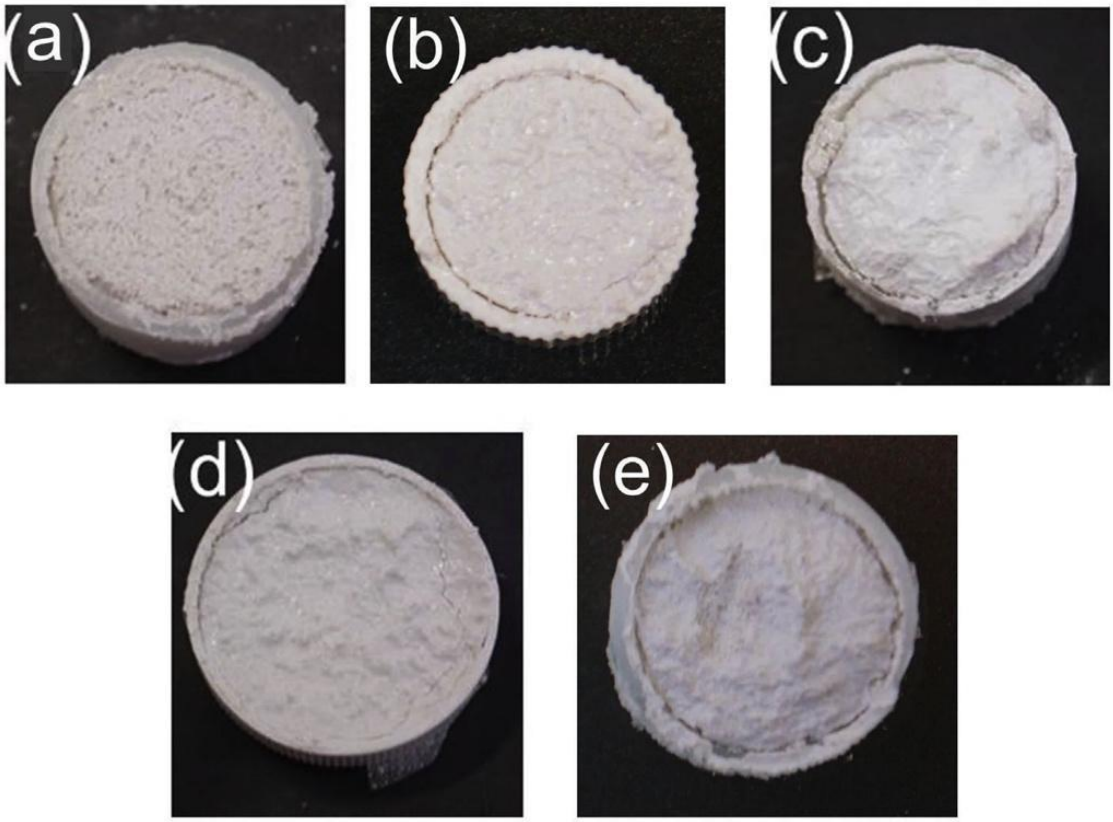

Fig.1: Photographs of prepared mortar samples. *©Manfredi Saeli*

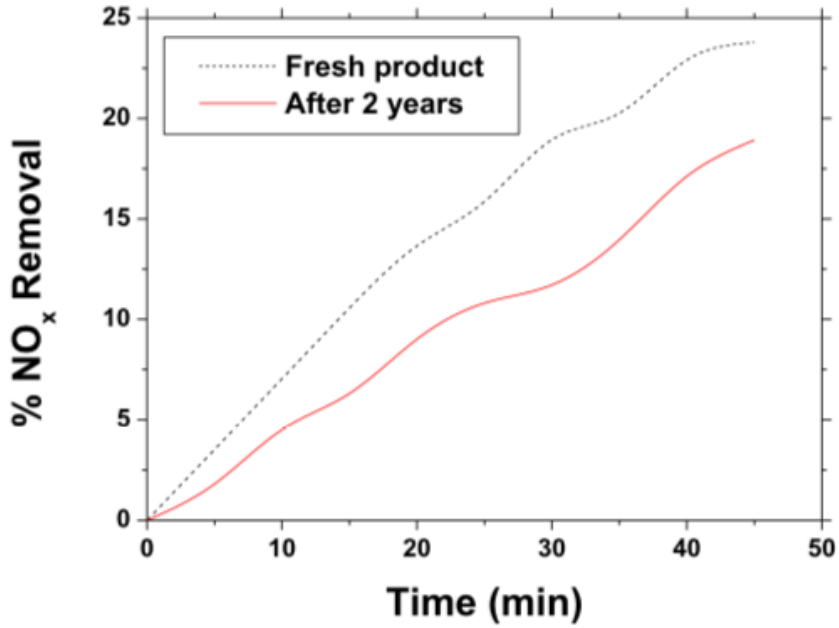

Fig.2: NOx abatement rate of the fresh manufactured plaster and after a period >2 years exposure to the atmosphere (durability validation). *©Manfredi Saeli*