

EUREKA PROJECT E!595 - EUROCARE EUROLITH

1. General description

Project	E! 595 - EUROCARE EUROLITH	Status	Finished - 20-JUN-1997
Title	New Protective Coatings (Pigmented Polymers) For Protection Of Marbles And Carbonate Stones Of Ancient Monuments/Statues		
Class	Sub-Umbrella	Technological area	Environment
Start date	01-APR-1992	End date	01-JAN-1996
Duration	45 months	Total cost	0.93 Meuro
Partner sought	No		
Summary	Development Of Suitable Products/Processes For Renovation And Protection Against Physical, Chemical And Biological Aggressions Generated By Atmospheric Agents, Various Salts And Capillary Spread, Etc.		

Budget and duration

Phase	Budget(Meuro)	Duration (Months)
Total	0.93	45

Member contribution

Member	Contribution	Position	Since
Greece	36.00%	Notified Finished	20-JUN-1997
France	64.00%	Notified Finished	25-APR-1996

Participants

Company	Country	Type	Role
Ntua-School Of Chem. Engineering, Mat. & Engineering Dept. National Technical University Of Athens	Greece	University	Main
Copalin Paint Industry	Greece	Large company	Partner
Uni.De Poitiers/Genie Civil/Lab.De Constr.Civil Et Maritime (Iut De La Rochelle)	France	University	Partner
Sicof S.A. (Saint Ouen L'Aumone)	France	SME	Partner
Societe Industrielle Et Commerciale De L'Ouest De France			

2. Project outline

Project description

The object of the programme is the preparation of appropriate systems for the protection of marbles and calcareous stones from atmospheric deterioration by SO₂.

The Scientist responsible for this project, Professor Th. Skoulikidis has found that the mechanism of the sulphation of marbles and calcareous stones is similar to the one valid for the union corrosion of metals (1-8*): galvanic cell model, i.e. the rate determining step is the solid state diffusion of Ca²⁺. Thus it is possible to protect marbles with the same systems used for the protection of metals, taking the Venice Charter naturally into account.

Coal Tar Epoxy (C.T.E.) and Chlorinated Rubber (C.R.) have already been checked with success (9-10) and can be used only for black marbles and C.R. changes its colour in U.V. light.

Thus they were checked (11-12) with success the following protective systems: appropriate polymers such as cross-linked acrylic (paraloid B 72) with appropriate n-semiconductor (Y1-AL₂O₃, Fe₂O₃ (13) pigments. It must be emphasized that if any unpigmented polymer is used, according to the mechanism of sulfation, the coatings crack (5).

We thought that the appropriate polymer to be used at first was the Paraloid B 72. But after experiments with U.V. it was found that some degradation is possible (14); thus anti-U.V. substances will also be used. In addition to this, the pigments also protect the polymer from U.V. influence. Nevertheless, other polymers will also be checked.

The quantity of n-semiconductors already used are: 30% for Al₂O₃ and 5% for Fe₂O₃. They do not appreciably alter the appearance of marble (the Fe₂O₃ for naturally patinated marbles), but it is necessary to decrease their quantity. Thus doped n-semiconductors will be used, basically Y-Al₂O₃ and Fe₂O₃ but also others.

Summarising, the object is to check and prepare on a large scale protective systems consisting of an appropriate polymer with appropriate intensive n-semiconductors.

(* Note: Numbers refer to literature on the subject - to be found in the EUREKA notepad).

Technological development envisaged

After laboratory experiments, the production of protection systems on a large scale is envisaged.

The NATIONAL TECHNICAL UNIVERSITY of GREECE will:

- prepare on a laboratory scale several doped n-semiconductors and select the appropriate polymer
- make tests on the protection of marble specimens coated with the systems polymer pigments and uncoated in a humid, SO₂ atmosphere and in a spray cabinet with H₂SO₄, HNO₃ and NaCl solutions

- select the appropriate systems

- carry out tests on specimens on a semi-industrial scale.

COPALIN will:

- prepare large quantities of the protection systems

selected

- prepare specimens on a semi-industrial scale
- carry out tests on a semi-industrial scale in a humid, SO₂ atmosphere in a spray cabinet with H₂SO₄, HNO₃, NaCl solutions and all other tests applicable to anti-corrosive paints.

The UNIVERSITY OF POITIERS will:

- carry out the following test on the selected coatings:
 - * simulated tests of weathering (acid rain and SO₂) and with natural sea water, the influence of U.V. and all their appropriate tests applicable to protective coatings.

SICOF will:

- contribute to research on stone and marble protection (especially in thin facing plates) and to the selection of products and processes best suited to the problem of alteration and crumbling of the above materials.

Markets application and exploitation

The results of the research will be developed in such a way that protective materials can be produced on a large scale by industries. Thus, they can be easily applied by public institutions (Museums, Ministries of Culture, Restoration Centres, etc.) and by private companies for the protection of monuments and modern buildings, which are exposed to pollution.

By public institutions in GREECE and other countries involved with the restoration and conservation of monuments (Ministries of Culture, Museums).

Project codes

BSI

BMB	sampling methods
DY	polymers
RXH.D	stone
ZO	history
ZV/ZY	culture
ZW	arts

NACE

3. Main participant

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Organisation type University
Participant role Main

Contribution to project

Will contribute with his laboratory, instruments and other facilities as well as with part of the salaries of his personnel.

Expertise

Extensive experienced in the field of conservation and restoration of stone monuments. Professor Th. Skoulikidis was awarded the 1989 UNEP prize for his work in this field.

4. Partner

Company **Copalin Paint Industry**
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Organisation type Large company
Participant role Partner

Contribution to project

Will contribute with all facilities of their industry.

Expertise

Extensive experience in the industrial production of protective coatings.

4. Partner

Company **Uni.De Poitiers/Genie Civil/Lab.De Constru.Civil Et Maritime
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Organisation type University
Participant role Partner

Contribution to project

Will contribute with all facilities of the laboratory and part of the salary of the scientific personnel.

Expertise

4. Partner

Company **Sicof S.A. (Saint Ouen L'Aumone) Societe Industrielle Et
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Fax**Organisation type**

SME

Participant rolePartner

Contribution to project

Will aim at ultimately marketing a coherent line of products suited for renovating and protecting substrates and will contribute with all facilities and expertise of their industry.

Expertise

Extensive experience in the industrial production of protective coatings. Manpower: 150: - Research and Test Application Laboratory: 9 - Technical Department (diagnostics and tests): 17.