



Umana[®] and S.A.R.C.[®] by Loggia Industria Vernici :

An original approach to the photocatalytic paints

Luigi Campanella *

Heterogeneous photocatalysis is a catalytic process which employs a just semiconductor ,i.e. a compound whose electrical conductivity can be increased by increasing temperature or by doping with impurities which ,under the action of an appropriate light source, has the function of catalyzing a photodegradation reaction.

This is a very effective oxidative process able to act on a wide variety of organic compounds and under mild conditions.



This methodology has recently become very important for degrading large numbers of recalcitrant substances in a simple ,fast and inexpensive manner.

The catalyst which is used most often is titanium dioxide in the form of anatase Degussa TiO₂ 50 square meter/g, proved to be more effective than all the other oxides ,as well as the other crystalline forms of the same oxide, rutile (tetragonal structure) and brookite (rhombic structure).

Titanium dioxide has a high photochemical reactivity , a relatively low cost, a remarkable stability in aqueous systems and a low environmental toxicity. Moreover, an advantage of photodegradation catalyzed by a semiconductor is that it is possible to use a cheaper source of energy .

In fact the light of the near UV component of solar radiation can be used to trigger the reaction mechanism.

The cooperation between Loggia Industria Vernici and Chemistry Dept of Sapienza University of Rome concerns the application of heterogeneous photodegradation to the abatement of indoor pollution



with the advantage at the same time to paint the inside (and outside) walls of our homes with paints of any color we wish.

The goal is very complicated to be obtained from a rigorous scientific point of view as the photodegradation of pollutants can proceed simultaneously with that one of the other organic components of the paint ,dyes enclosed, with following aesthetic, economic and structural damages, particularly proceeding on ageing.

So clean air could be associated to fable colors and to frequent renewing needed operations.

The project we are running together foresees in the addition to the paint of an antioxidant able to be scarified in the photodegradation in place of the components of the paint, especially of the color, so maintaining it as more stable as possible, even with the passage of time; really ageing could be an enemy of the photocatalytic paints.

The research for the protective additive has obtained significantly consistent results.



It is clear that the modified system needs more than ever to be checked: so we also set upon electrochemical method of testing photocatalytic activity and its possible variations: during the time by a simple and not invasive. innovative approach.

Prof. Luigi Campanella
Chemistry Department



**About Prof. Luigi Campanella.*

Degree in Chemistry and qualified as chemist on 1961

University teaching qualification for Electrochemistry Stabilized in charge Professor of "Practice Industrial Chemistry II" and then of "Practice of Applied Chemical Analysis" at the University "La Sapienza" of Rome from 1967 to 1980.

Full Professor of "Analytical Chemistry" at the University "La Sapienza" of Rome since 1980 and of Environmental and Cultural Heritage Chemistry since 2003.

Also Professor of "Agricultural Chemistry" and then "Soil Chemistry since 1994, of "Restoration Chemistry" since 1998 and of Food Chemistry since 2003 at the University "La Sapienza" of Rome.

President of the Council of the Industrial Chemistry Course from 1981 to 1983

Head of the Chemistry Department in the period 1983-86.

Director of the Ph.D. course in Chemical Science at the University of Rome.

Dean of the Faculty of Mathematical, Physical and Natural Science of "La Sapienza" University of Rome from 1988 to 1994

Author of about 500 publications in the field of Analytical Chemistry, Electrochemistry,

Environmental Chemistry and Analytical Biotechnology.

Particularly he set characterized and applied many biosensors, based on immobilized enzymes or vegetal tissues, to determine compounds of clinical, pharmacological and environmental interest.

These let him to participate as a member to the CEE Research Group on "Biosensor".

He also studied the application of chemical and biological procedures for the remediation of polluted (by surfactants, hydrocarbons, pesticides, heavy metals) civil and industrial wastes.

Prof. Luigi Campanella
Università degli Studi di Roma "La Sapienza"
CF 80209930587 PI 02133771002
Ordinario di Chimica Analitica-Presidente MUISIS-Direttore Museo di Chimica
Piazzale Aldo Moro 5, 00185 Roma
T (+39) 06 4991 3744 F (+39) 06 4991 3725
luigi.campanella@uniroma1.it



He participated at about 500 national and international Congresses.

Author of five books in the fields of Analytical Chemistry, Applied and Industrial Chemistry, Philosophy of Chemistry, Chemistry of Cultural Heritage

President of the Division "Analytical Chemistry" of the Italian Chemistry Society from 1989 to 1990 and of the Environmental and Cultural Heritage Chemistry Division since 2004 till 2006

Vice President of the Italian Chemistry Society from 1990 to 1992.

President of MUSIS (Museum of Science and Scientific Technology) in 1991.

Scientific adviser of Rome mayor from 1993 to 1997.

Visit Scientist in Russia (MOSCOW University and Museum), Poland (Warsaw University), Canada (Moncton University), China (Pechino Environmental Sciences Institute), USA (Oak Ridge Labs), Tunisia (Tunis City of Science), Cuba (L'Avana University).

Representant of Italy in IUPAC (International Union of Pure Applied Chemistry)

Member of EUCHEM, American Chemical Society, AOAC

Responsible of International Research Agreement with L'Avana University Faculty of Sciences, with Lomonosov (Moscow) University Center of Eco Health

Member of various Study Commissions in CNR (National Research Council), MURST (Ministry of the University and of Scientific and Technological Research), ENEA (New Technology, Energy and Environmental Agency), between which the Infrastructure, Innovative Materials and Chemistry

Committee of MURST, the Metals Group of Water Research Institute of CNR



Winner of International Capire Prize for a creative future on 1994 , of the European E.I.P. (School as instrument of peace) Prize on 1996 and of the Prize Science for Peace (Convention 2005)

Gold Medal 2003 of the Environmental Chemistry Division of Italian Chemical Society.

2007 Liberti Medal of Italian Chemical Societ

list of relevant publications to the call content :

*Bellanti F; Castrucci M; Ruiiu D; Visco G; L. Campanella (2010).
Comparison of catalytic efficiency of some industrial nanosized titanium dioxides in heterogeneous*

Photodegradation by chemometric analysis, Current Analytical Chemistry (ISSN:1573-4110), 100-110, 6;

*L. Campanella; Battilotti M.; Costanza C. (2005).
Fotodegradazione e degradazione elettrochimica di coloranti, Inquinamento (ISSN:0001-4982), 22-28, 47;*

*L. Campanella; C. Beni; M. Giovannangelo (2005).
Fotodegradazione eterogenea catalizzata, Inquinamento (ISSN:0001-4982), 50- 54, 75;*

*L. Campanella; I. Giardina; M. V. Russo; M. P. Sammartino; G. Visco (2004).
Photodegradation of azodyes: comparison of different catalytic systems and control of the effective mineralisation, Annali di Chimica (ISSN:0003-4592), 655- 668, 94 (9-10);*

*L. Campanella; Battilotti M.; Borsella E.; Pastorelli A. (2003).
Fotodegradazione di nitrofenoli catalizzata da sistemi misti, Inquinamento (ISSN:0001-4982), 48- 55, 45;*

*L. Campanella; Contucci P; M.V. Russo (2003).
Fotodegradazione di contenitori in Polietilenftalato, Lab (ISSN:0390-069x), 14- 21, 3;*



L. Campanella; Spadaro C. (2001).

Fotodegradazione di PVC con catalizzatori misti, Inquinamento (ISSN:0001-4982), 52- 54, 33;

A.Macchia, S.Nunziante Cesaro, L.Campanella, A.Maras, M.Rocchia, G.Roscioli (2013).

Which light for cultural heritage: comparison of light sources with respect to Realgar Photodegradation, Journal of Applied Spectroscopy (ISSN:0021-9037), 655-661, 80 ;

L. Campanella; Battilotti M; Costanza C (2005).

Studies on simulated ageing of paper by photochemical degradation, Annali di Chimica (ISSN:0003-4592), 727-740, 95;

L. Campanella; Battilotti M.; Costanza C. (2004).

Studio della degradazione fotochimica della carta, Ambiente Risorse Salute (ISSN:0393-0521), 6- 13, V;

L. Campanella; R. Grossi; E. Martini; G. Visco (2004).

Degradation of pollutants by microwaves, Current Topics In Analytical Chemistry (ISSN:0972-4451), 37-43, 4;

L. Campanella; Marturano S.; Sammartino M.P. (2001).

Degradazione di inquinanti organici recalcitranti mediante catalizzatori misti, Acqua & Aria. (ISSN:1591-237X), 77- 81, (5);