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PERSONAL

Date and Place of Birth: 3-11-1947, Paleochorion Dorieon Phthiotidos, Greece

Marital Status: Married to Manuela Plataki (Psychologist), two children

Education: BS University of Thessaloniki, Physics Dept., Greece, 1970
PhD University of Tennessee, Physics Dept., Knoxville, Tenn., USA, 1978

Military Service: 1970-1973 Greek Army

Employment:

2014- Professor Emeritus, University of Patras, Patras, Greece
1992-2014 Professor, University of Patras, Patras, Greece
1984-1992 Associate Professor, University of Patras, Patras, Greece
1982-1984 Lecturer, University of Crete, Heraklion, Greece
1978-1982 Research Associate, Université Louis Pasteur, Strasbourg, France

Knowledge of Languages: Greek (mother tongue),
English and French (Spoken and written),
Russian and Spanish (written).

SUMMARY OF RESEARCH INTERESTS

- **Colloids and Surfaces:** Structure and dynamics of micelles, microemulsions and lipid vesicles. Self-organization of surfactants and lipids in solution and in thin films. Interaction of proteins with lipid bilayers. Growth of organic or inorganic particles in organized molecular assemblies. Water-soluble polymers. Hydrogels-Cross-linked hydrophilic polymers.
- **Photophysics:** Photophysical studies of aromatic molecules, semiconductors and conjugated polymers. Fluorescence probing of organized molecular assemblies, gels and macromolecules. Light emission and amplification. Lasers. Organic LEDs. Solar Cells.
- **Materials and Devices:** Sol-gel chemistry. Semiconductor nanoparticles. Heterogeneous photocatalysis for water and air purification. Organic and Hybrid Organic-Inorganic Mesoscopic Solar Cells. Organic light-emitting diodes. New materials for light emission and amplification. Water purification materials. Photocatalytic hydrogen production. Photoelectrocatalytic hydrogen and electricity production. Perovskite solar cells. Metal-air batteries. Supercapacitors

SUMMARY OF PUBLISHED WORK AND ITS IMPACT

Publications in International journals	323
Citations	~15500*
h-index	64*
i10-index	249*

*Source: Google scholar

RESEARCH HIGHLIGHTS

Fluorescence probing of organized molecular assemblies. Prof.Lianos' early scientific work on fluorescence probing of organized molecular assemblies including micelles, microemulsions and lipid vesicles has been widely cited. In this respect, a significant contribution is made by introducing the idea of non-integer-dimension diffusion of reactants in organized molecular assemblies.

Semiconductor nanoparticles synthesized by surfactant templating. Prof.P.Lianos is among the first researchers who used self-organized molecular assemblies as templates to synthesize nanocrystalline semiconductors. Thus in 1985 he synthesized CdS quantum dots using reverse micelles and later he used a similar technique to synthesize finely distributed anatase nanoparticles of controlled size. The related publications have been widely cited.

Quasi-solid state Dye-sensitized Solar Cells. He has developed quasi-solid state dye-sensitized solar cells, where the liquid electrolyte is substituted by a gel, comprising functional redox species. Such cells do not need sealing since the gel electrolyte plays the additional role of acting as adhesive holding electrodes together and as sealant protecting active components. The gel is based on a Ureasil, which is polymerized by means of the sol-gel condensation procedure.

Photoluminescence and Electroluminescence of composite materials. Composite organic-inorganic materials demonstrate photoluminescence and electroluminescence deriving from unconventional excitation routes differing from common molecular or excitonic transitions. Even though, this issue remains unresolved, Prof. Lianos has performed some pioneering studies in this domain.

Graphene-based electrocatalysts for sensitized solar cells. Very efficient reduction electrocatalysts have been developed in recent years by based on a combination of graphene and organic conductive polymers as well as graphene and active elemental dopants. Such electrocatalysts have been used as counter electrodes in sensitized solar cells and also in Photocatalytic Fuel Cells.

Photocatalytic and photoelectrocatalytic hydrogen and electricity generation

Photocatalytic Fuel Cells have been intensively studied in recent years. Functional devices have been designed and constructed with results that encourage upscaling. Device designs apply to both electricity and hydrogen production.

Perovskite solar cells

Soluble butyl substituted copper phthalocyanine has been successfully introduced as alternative low cost hole transporting material. Competitive solar conversion efficiencies have been obtained by introducing graphene oxide as intermediate buffer layer. Also graphene oxide and modified graphene oxide have been employed as hole and electron transporting agents in inverted all inorganic perovskite solar cells. Fully printable perovskite solar cells have been developed using inorganic components.

Supercapacitors

Supercapacitors have been developed by employing biochar, i.e. porous carbon obtained by calcination of biomass under limited oxygen supply and further treatment in strong alkaline environment. These materials reach very high specific surface and because they are electrically conductive they can make a superconductor in conduct with an electrolyte. They have been combined with photoelectrochemical cells to store energy.

Metal-air batteries

Al-air and Zn-air batteries can be used as handy and powerful electric power sources. Electricity can be stored in the form of pure metal by electrolysis of the corresponding oxides. Photoelectrochemical cells have been combined with Zn to store energy in the metal by conversion of solar energy.

PARTICIPATION IN RESEARCH PROJECTS (10 year track)

He has participated in a total of 55 research projects, in most of them being coordinator. During the last 10 years he has participated in the following projects:

1. Development and pilot plant demonstration of hydrogen production from solar energy and biomass (waste) compounds and derivatives at ambient conditions mediated by nanostructured photocatalysts. (Participant, E.ON International Research Initiative 2009-2013) 400000€
2. Study of the Photoelectrochemical production of hydrogen and electricity by using hybrid organic-inorganic structures (Coordinator, Program ΗΡΑΚΛΕΙΤΟΣ 2010-2013) 45 000€
3. Innovative materials for nanostructured solar cells. Coordinator, THALES, 2012-2015, 600000€
4. Development of innovative photofuel cells for the production of electricity and hydrogen by consumption of wastes using solar radiation. Participant, THALES, 2012-2015, 600000€
5. Graphene and nanocomposite materials. Production, properties and applications. Participant, THALES, 2012-2015, 600000€
6. Solar-powered photoactivated fuel cells producing electricity by photocatalytically consuming water wastes. Coordinator, ARISTEIA, 2012-2015 520000€.
7. Efficient wastewater treatment with nanocrystalline transition metal oxides modified with noble metals and non-metals. Coordinator, GR-RO R&T cooperation, 2012-2014 15000€.
8. Energy autonomous smart greenhouse. Participant, SYNERGASIA 2013-2015 130 000€ (2.5 M€ total budget).
9. Innovative materials for solar cell design and demonstration, Coordinator, GR-DE cooperation program 2013-2015 2x 250000€.
10. New quinone/hydroquinone metal complexes for the catalytic conversion of H₂O/O₂ to H₂O₂ and the construction of aqueous photosynthetic solar cells. Contractor. EXCELLENCE (University of Cyprus) 2019-2022.

TEN MOST RECENT PUBLICATIONS

1. *Charging a vanadium redox battery with a Photo(catalytic) Fuel Cell*: Tatiana Santos Andrade, Vassilios Dracopoulos, Anastasios Keramidis, Márcio César Pereira and Panagiotis Lianos, *Solar Energy Materials and Solar Cells*, 221 (2021) 110889 (6p) <https://doi.org/10.1016/j.solmat.2020.110889>
2. *Biochar obtained by carbonization of spent coffee grounds and its application in the construction of an energy storage device*: Tatiana Santos Andrade, John Vakros, Dionissios Mantzavinos and Panagiotis Lianos, *Chemical Engineering Journal Advances*, 4 (2020) 100061 (7p) <https://doi.org/10.1016/j.cej.2020.100061>
3. *A photoassisted hydrogen peroxide fuel cell using dual photoelectrodes under tandem illumination for electricity generation*: Tatiana Santos Andrade, Bárbara Antunes Cunha Sá, Izabela Campos Sena, Antero Ricardo Santos Neto, Francisco Guilherme Esteves Nogueira, Panagiotis Lianos, Márcio César Pereira, *Journal of Electroanalytical Chemistry*, 881 (2021) 114948 <https://authors.elsevier.com/c/1cMTc5bbJ5d0-S>
4. *Solar energy conversion and storage using a photocatalytic fuel cell combined with a supercapacitor*: Tatiana Santos Andrade, Vassilios Dracopoulos and Panagiotis Lianos, *Electronics* 10 (2021) 273. <https://www.mdpi.com/2079-9292/10/3/273>
5. *Biochar from spent malt rootlets and its application to an energy conversion and storage device*: John Vakros, Ioannis D.Manariotis, Vassilios Dracopoulos, Dionissios Mantzavinos and Panagiotis Lianos, *Chemosensors* 9 (2021) 57 <https://www.mdpi.com/2227-9040/9/3/57>
6. *Production of hydrogen peroxide with a photocatalytic fuel cell and its application to UV/H₂O₂ degradation of dyes*: Rebecca Dhawle, Zacharias Frontistis, Dionissios Mantzavinos and Panagiotis Lianos, *Chemical Engineering Journal Advances* 6 (2021) 100109 <https://doi.org/10.1016/j.cej.2021.100109>
7. *Decreasing the charging voltage of a zinc-air battery using a bifunctional W:BiVO₄/V₂O₅ photoelectrode and sulfite as a sacrificial agent*: Tatiana Santos Andrade, Izabela Campos Sena, Luiz Carlos Alves de Oliveira, Panagiotis Lianos and Márcio César Pereira, *Materials Today Communications*, 28 (2021) 102546 <https://doi.org/10.1016/j.mtcomm.2021.102546>

8. *UV/H₂O₂ degradation of diclofenac in a photocatalytic fuel cell*: Rebecca Dhawle, Dionissios Mantzavinos and Panagiotis Lianos, *Applied Catalysis B: Environmental*, 299 (2021) 120706 <https://doi.org/10.1016/j.apcatb.2021.120706>
9. *Four electron selective O₂ reduction by a tetranuclear vanadium (IV/V)/hydroquinonate catalyst: application in the operation of Zn–air batteries*: Anastasios Keramidas, Sofia Hadjithoma, Chryssoula Drouza, Tatiana Santos Andrade and Panagiotis Lianos, *New Journal of Chemistry*, 46(2022)470-479 <https://pubs.rsc.org/en/content/articlehtml/2022/nj/d1nj03626b>
10. *Enhancement of the photoelectrochemical production of hydrogen peroxide under intermittent light supply in the presence of an optimized biochar supercapacitor*: Rebecca Dhawle, John Vakros, Vassilios Dracopoulos, Ioannis D. Manariotis, Dionissios Mantzavinos and Panagiotis Lianos, *Electrochimica Acta*, 427 (2022) 140846 <https://doi.org/10.1016/j.electacta.2022.140846>