CURRICULUM VITAE SAVVAS ORFANIDIS
DATE OF BIRTH: MARCH 18 1991
PLACE OF BIRTH: ATHENS GREECE
CITIZENSHIP: GREEK

Personal and Contact Information

Name: Savvas Orfanidis
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Date of Birth: 18 March 1991
Citizenship: Greek
Marital status: Single

EDUCATION

- 2017/ Today PhD Candidate of the University of Ioannina Engineering Materials Science / Institute of Nanoscience and Nanotechnology NCSR Demokritos
  - Composite and Smart Materials Laboratory (CSML)
  - Nuclear Magnetic Resonance Laboratory (NMR)

- 2009/2016 *Diploma in Material Science & Engineering*

  Department of Materials Engineering, School of Applied Sciences**,** University of Ioannina
  Indicative Courses: Polymer Science, Polymer Technology Laboratory, Metallurgy I/II, Material Mechanics, Welding Technology, NDE, Corrosion & protection, Industrial Alloys, Aluminum Technology, Mechanical behavior of composite materials, Ceramic material lab, Metallic material lab, Composite material lab, Characterization of mater lab (XRD/DSC/IR-UV/TGA), Lab of Mechanical testing.
  Study emphases: Corrosion & protection, advanced composite materials, metal alloys, mechanical testing & electrochemical testing, advance material characterization technics.
  Diploma thesis: Electrochemical & mechanical study of marine alloys adhesively bonded with nano-reinforced epoxy adhesives.

  Advisor: A. S. Paipetis

  PhD thesis: Innovative Methods for the Evaluation of Advanced Composite Materials in simulated operating environments.

  Advisors: A. S. Paipetis, Georgios Papavassiliou, Evangelos Hristoforou

PUBLICATIONS

- Study of biological hydroxyapatite by nuclear Magnetic Resonance (^{31}P NMR) V. Papavasileiou,X. Gavriniotis, S. Orfanidis,S. Agathopoylos, M. Fardis. National Conference of Hellenic Ceramic Society. (poster)

- «Electrochemical and mechanical study of steel coupled with nano-reinforced adhesives» S. Orfanidis, D. Baltzis, A.Lekatou, A. S. Paipetis**.** 4th International Conference of Engineering Against Failure (ICEAF IV)24-26 June 2015, Skiathos, Greece (conference paper)

- Stainless Steel coupled with carbon nano-tube modified epoxy and carbon fibre composites: Electrochemical and mechanical study. D. Baltzis, S. Orfanidis, A.Lekatou, A. S. Paipetis. Plastics, Rubber and Composites: Macromolecular Engineering.

- The study of mechanical and electrochemical integrity of Invar bonded with nano-modified epoxy resin. S. Orfanidis, D. Baltzis, A.Lekatou, A. S. Paipetis**.** 6th Pan-Hellenic Conference on Metallic Materials 7-9/12/2016, Ioannina, Greece (conference paper)

- Microcapsule-based self-healing materials: Healing efficiency and toughness reduction vs. capsule size. Maria Kosarli , Dimitrios G. Bekas , Kyriaki Tsirka , Dimitrios Baltzis ,Dimitrios T. Vaimakis-Tsogkas , Savvas Orfanidis , Georgios Papavassiliou, Alkiviadis S. Paipetis. Composites Part B 171 (2019) 78–86

CONFERENCES

3-4/4/2014 6th National Conference of Hellenic Ceramic Society (poster presentation)

24-26/6/ 2015 4th International Conference of Engineering Against Failure (visual presentation)

7-9/12/2016 6th Pan-Hellenic Conference on Metallic Materials (visual presentation)

3-6/9/2019 9th EASN International Conference on Innovation in Aviation & Space (visual presentation)

2-4/9/2020 10th EASN International Conference on Innovation in Aviation & Space (visual presentation)

5-8/7/2021 17th EUROMAR International Conference (poster presentation)

1-3/9/2021 11th EASN International Conference on Innovation in Aviation & Space (visual presentation)

SEMINARS

- Microscopy seminars organized by INN-NCSR Demokritos total duration 8 hours, (Optical Microscopy, Electronic Microscopy, Atomic Force Microscopy, Electron Microscopy Image Metrology).
- Spectroscopy seminars organized by INN-NCSR Demokritos total duration 22 hours (IR-UVvis spectroscopy, NMR spectroscopy, EPR spectroscopy, XRD spectroscopy, XRF spectroscopy, Mossbauer spectroscopy, Raman spectroscopy, XPES spectroscopy).
- Artificial Intelligent seminars organized by INN-NCSR Demokritos total duration 8 hours < *Artificial Intelligent in nanotechology & nanoelectrincs applications* >.

Research and industrial projects

2017/today Magnetic Nanoparticles (MNPs) for Reservoir Characterization.

Special Occupation: The structural and mechanical characterization of composite polymer-steel materials and the construction of a laboratory oil tank simulator made of steel reinforced with composite materials and the synthesis of ferrous nano-particles and high density ferrofluids.

TEACHING

2019/today. Teaching and demonstrates Nuclear Magnetic Resonance spectroscopy (NMR) for the Materials Characterization course [NTUA] (undergraduate & Master’s students).

2020/today. Provide private lessons for materials mechanics and materials science (undergraduate students).

LANGUAGES & Computer Skills

Greek (native language)

English (lower certificate)

Microsoft word, Microsoft excel, Microsoft PowerPoint, Origin, Matlab.

Diploma thesis Abstract

Adhesive bonding repair could be a cost-effective way to repair off-shore and underwater marine structures like pipelines. Furthermore, when composite materials are used as bonded patches, the tailoring of the composite to the structure makes it possible to repair without having to replace parts, resulting in less dead time and decrease repair costs. Nano-scaled reinforcements, such as multiwall carbon nanotubes (MWCNTs), were seen to be beneficial when used as fillers in adhesives or rather in conventional composites over the last decades. The electrochemical and mechanical behavior of stainless steel 304L coated and adhesively bonded with nano-reinforced epoxy resin containing varying concentrations of CNTs in a simulating operational environment. The shear strength of nano reinforced adhesives was studied using Lap shear specimen geometries, while electrochemical potensiodynamic studies were conducted on aqueous 3.5 percent NaCl solution. In both cases, the nano reinforced adhesives exhibited promising corrosion protection by preventing the electrolyte from reaching the metallic substrate. The lap shear strength improved significantly, with the 0.6 percent of CNTs having the highest shear strength.

Doctor of Philosophy {PhD} thesis Abstract

Due to their ability to repair large-scale matrix damages in polymer composites, microcapsule-based polymer self-healing composites may be the most effective self-healing system in the aerospace field. A defect or vulnerability in the material can cause degeneration, which can potentially lead to significant damage. The aim of this research is to develop a new non-destructive evaluation approach that uses a powerful spectroscopic technique such as nuclear magnetic resonance to ensure the quality of microcapsule production.

The necessity of the entire micro-capsule production was crucial regarding the findings of the literature that proves that the reducing of the microcapsule’s diameter, the amount of the encapsulated self-healing agent increases and as a result thins the capsule shell. Because the mass loss of the shell, the microcapsules are more fragile and prone to failure in the production line, these aspects increased the risk of using damaged microcapsules in the final composite structure. By using a spin-spin relaxation time (T2) ^{1}H NMR measurements to determine the amount of encapsulated self-healing agent; the correlation of the signal intensity with the amount of self-healing agent was successful for first time in the literature using a Non-Destructive Evaluation methodology.

These encouraging results have given me the impetus to explore the capabilities of NMR and design more detailed and applicable experiments in the field of self-healing systems in the aerospace sector in order to explore different aspects. The temperature fluctuations are one of numerous ‘threats’ of every aerospace structure, for this prepuce I design thermal fatigue measurements to ensure the structural integrity of the microcapsules during the flight cycles (-30ºC to +60ºC) which are typical temperatures in the aerospace field. The samples were immersed in each temperature for four hours. The temperature was controlled by an intelligent temperature controller (ITC) and by flowing liquid nitrogen directly into the sample. The main objective of this experiment was to observe any changes in the samples at room temperature. The measurements showed that after four steps the self-healing agent had been affected chemically and the capsules’ cell was intact. In order to apply this methodology to the production process on a laboratory scale a portable NMR device was designed, the purpose of this effort is to allow the entire microcapsule production to be tested in the manufacturing laboratory without the risk of damaging the microcapsule by transporting it from the manufacturing environment to the testing laboratory.

Finally, the contribution of my study is the introduction of a powerful spectroscopic technic such as Nuclear Magnetic Resonance (NMR) that can reveal more information about the progress of all these reaction in real time. Our approach adds a new arrow to material engineers’ quiver, the NMR spectroscopy can be used as a material characterization and as a non-destructive evaluation (NDE) method at the same time, in this study I used the solid-state proton NMR (H^1NMR) to monitor the rheological behavior of the self-healing agent and mapping in real time the self-healing progress.