

Vito Di Noto - ORCID: 0000-0002-8030-6979

Vito Di Noto is Full Professor of Electrochemistry for Energy and Solid-State Chemistry in the Department of Industrial Engineering of the University of Padova, Italy. He is “*Fellow of The Electrochemical Society*”, he is a “*Japan Society for the Promotion of Science Fellow*” and he is President of the Electrochemistry Division of the Italian Chemical Society.

He is the Head of the Section of Chemistry for Technology in the same Department, and the founder and the team leader of the research group “*Chemistry of Materials for the Metamorphosis and the Storage of Energy – CheMaMSE*” (http://www.disc.chimica.unipd.it/lab_DiNoto/). Recently he has been ranked among the top 2% scientists in the world as per subject wise analysis carried out by Stanford university.

Vito Di Noto is an electrochemist with more than 30 years of experience in the research and development activities of advanced functional materials for electrochemical energy conversion and storage devices, including primary and secondary batteries running on alkaline and alkaline-earth elements. In the late ‘90s he pioneered the secondary magnesium ion battery and devised breakthrough approaches for the synthesis of electrolytes and electrode materials. He also provided seminal contributions to the understanding of the mechanisms of ion conduction in condensed phases.

His research activity covers the following three main topics:

- I. Electrode materials and electrolytes for energy conversion and storage devices: anion-exchange membrane fuel cells (AEMFCs), proton exchange membrane fuel cells (PEMFCs), high-temperature proton exchange membrane fuel cells (HT-PEMFCs), direct methanol fuel cells (DMFCs), PEM electrolyzers and redox flow batteries (RFBs).
- II. Polymer electrolytes and electrode materials for secondary batteries based on alkaline and alkaline-earth elements (*e.g.*, Li, Mg, Na, Ca).
- III. Study of the electric response of ion-conducting, electric and dielectric materials by Broadband Electrical Spectroscopy (BES).

The results of his research activities were the basis of several technology transfer processes and led to several national and international patents sold to private companies. The following is his scientific performance:

- 312 published papers: 263 are peer-reviewed papers (ISI+SCOPUS), 10 are book chapters, 30 patents (13 international and 17 national, 13 were sold) and 10 are papers on proceedings.
- The meeting contributions are 296, of which: (i) 199 are oral presentations in international symposia, among which 84 are invited: 60 invited, 15 Keynotes and 8 Plenary Lectures; (ii) 24 are oral presentations in national meetings, of which 4 are invited.

h-index = 48 (Google Scholar), more than 7780 citations (August 2021). h-index = 45 (Scopus), more than 6310 citations (August 2021). h-index = 43 (ISI), more than 6000 citations (August 2021).

COMMISSIONS OF TRUST

In the European Union (EU): Since 22 November 2017 he is an elected Vice-Coordinator of SubProgramme 1 - “*Electrolytes*” of the “*Joint Research Programme on Fuel Cells and Hydrogen Technologies (FCs&H₂)*” of the “*European Energy Research Alliance (EERA)*”.

In the Electrochemical Society (ECS): (i) he is an elected “*member-at-large*” of the Executive Committee of: (a) the Energy Technology Division (ETD); and (b) the Physical and Analytical Electrochemistry Division; (ii) from September 2014 to September 2017 and then, since 2021 he was elected: (a) Member, and later President of the committee for the assignment of the ETD Srinivasan Award; and (b) Member of the ETD Graduate Student Award committee.

He was also the Treasurer of the International Society of Solid State Ionics (ISSI) from June 2017 to June 2019.

Prof. Di Noto belongs to the “Strategic Technical Committee” (Comitato Tecnico Strategico) constituted by Veneto Sviluppo S.p.A. and Regione Veneto in compliance with the DGR n. 526 of 27 April 2021. The purpose of this Committee is to analyze the economic phenomena of the Venetian Region to define strategic guidelines in the post-COVID recovery timeframe. This will allow to devise plans to maximize the impact of the funds obtained through the Next Generation EU (Recovery Plan). The Committee will be tasked to carry out studies and planning to provide the Venetian Regional Government with evaluation and strategic guidelines in a medium- and long-term time framework.

RESPONSIBILITY IN MEETINGS

He was the Conference Chairman of: (i) “21st International Conference on Solid State Ionics – SSI-21”, Padova, Italy, 18-23 June 2017, more than 1400 participants; (ii) “7th German-Italian-Japanese meeting of Electrochemists – 7th GIJME”, Padova, Italy, 14-16 June 2014, more than 100 participants; (iii) “12th International Symposium on Polymer Electrolytes – ISPE-12”, Padova, Italy, 29 August – 3 September 2010, more than 280 participants. He was Chair/Co-Chair of: (i) Symposium 7 – “Electrochemical Systems for Energy Conversion: Fuel Cells and Electrolysers”, 69th ISE Meeting, Bologna, Italy, 2-7 September 2018; (ii) “The Second International Symposium on Magnesium Batteries – MagBatt II” (CO), Ulm, Germany, 27-28 September 2018, among many others. In the last 10 years, he organized or co-organized more than 35 thematic Symposia at the biannual Meetings of the Electrochemical Society.

PANELS OF REVISION

The European Commission (Horizon 2020); United States – Israel Binational Science Foundation; German-Israeli Foundation for Scientific Research and Development; American Chemical Society Petroleum Research Fund; National Science Foundation (NSF); Italian Ministry of Education and Research (MIUR).

ONGOING/COMPLETED NATIONAL/INTERNATIONAL PROJECTS IN THE LAST 5 YEARS

- “Development, characterization and tests in prototype devices of ion-exchange membranes for next-generation redox flow batteries”, project funded by ENI S.p.A. From 1st July 2016 (48 months).
- European “Graphene Flagship”: Project “Graphene Flagship Core Project 2”. From 1st April 2018 (24 months). **TRL 5-7**
- “Next-generation redox flow batteries: preparation, characterization and test in prototype devices of high-selectivity ion-exchange membranes and system integration with intermittent primary sources”. Project funded by ENI S.p.A.. From 5 September 2018 to 4 November 2019 (14 months).
- “Single-tank”, “single-pass” redox flow battery systems with an innovative architecture and approach to operation. Project funded by FUJIFILM MANUFACTURING EUROPE B.V. From 01 November 2018 to 31 October 2019 (12 months).
- “Versatile Ionomers for Divalent Calcium batteries – VIDICAT” FET-Open call of Horizon 2020, Project 829145, From 1st March 2019 (48 months). Principal Investigator: Prof. Jean-Yves Sanchez, University “Charles III” of Madrid, Spain.
- Advanced Low-Platinum hierarchical Electrocatalysts for low-T fuel cells (ALPE), Upscaling project funded by EIT Raw Materials. From 1 January 2020 (41 Months).
- “Development of high-selectivity ion-exchange membranes for application in next-generation redox flow batteries”. Project funded by ENI S.p.A. From 20 January 2020 to 20 November 2021 (23 months).
- European “Graphene Flagship”: Project “Graphene Flagship Core Project 3”. From 1st April 2020 (39 months). **TRL 6-8**
- Alkaline Membranes and Platinum-free catalysts Enabling innovative, open electrochemical devices for Energy storage and conversion (AMPERE). Project funded in the framework of “Bando FISIR 2019”. From 1st March 2021 (36 months).

SELECTED PUBLICATIONS

- **V. Di Noto**, E. Negro, A. Nale, G. Pagot, K. Vezzù, P. Atanassov, Hidden in plain sight: unlocking the full potential of cyclic voltammetry with the thin-film rotating (ring) disk electrode studies for the investigation of oxygen reduction reaction electrocatalysts, *Curr. Opin. Electrochem.* **25**, 100626 (2021). DOI: 10.1016/j.coelec.2020.08.008
- K. Kobayashi, G. Pagot, K. Vezzù, F. Bertasi, **V. Di Noto**, Y. Tominaga, Effect of plasticizer on the ion-conductive and dielectric behavior of poly(ethylene carbonate)-based Li electrolytes, *Polymer J.* **53**, 149-155 (2021). DOI: 10.1038/s41428-020-00397-4
- R. Dominko, J. Bitenc, R. Berthelot, M. Gauthier, G. Pagot, **V. Di Noto**, Magnesium batteries: current picture and missing pieces of the puzzles, *J. Power Sources* **478**, 229027 (2020). DOI: 10.1016/j.jpowsour.2020.229027.
- C. S. Martinez-Cisneros, A. Fernandez, C. Antonelli, B. Levenfeld, A. Varez, K. Vezzù, **V. Di Noto**, J. Y. Sanchez, Opening the door to liquid-free polymer electrolytes for calcium batteries. *Electrochim. Acta* **353**, 136525 (2020), DOI: 10.1016/j.electacta.2020.136525

- G. Pagot, K. Vezzu, A. Nale, M. Fauri, A. Migliori, V. Morandi, E. Negro, **V. Di Noto**, Chrysalis-like Graphene Oxide Decorated Vanadium-based Nanoparticles: an Extremely High-Power Cathode for Magnesium Secondary Batteries, *J. Electrochem. Soc.* **7**, 070547 (2020), DOI: 10.1149/1945-7111/ab7fb4
- **V. Di Noto**, E. Negro, A. Nale, P. J. Kulesza, I. A. Rutkowska, K. Vezzù, G. Pagot, Correlation between Precursor Properties and Performance in the Oxygen Reduction Reaction of Pt and Co “Core-shell” Carbon Nitride-based Electrocatalysts, *Electrocatalysis* **11**, 143-159 (2020).
- A. Kusoglu, K. Vezzù, **V. Di Noto**, A.M. Herring et al., Transport and Morphology of a Proton Exchange Membrane Based on a Doubly Functionalized Perfluorosulfonic Imide Side Chain Perfluorinated Polymer, *Chem. Mater.* **32**, 38-59 (2020).
- K. Vezzù, G. Nawn, G. Pagot, E. Negro, A. Nale, Y. Herve Bang, F. Conti, G. Cavinato, **V. Di Noto**, Relaxation phenomena and conductivity mechanisms in anion-exchange membranes derived from polyketone, *Electrochim. Acta* **319**, 253-263 (2019).
- C. Sun, E. Negro, K. Vezzù, G. Pagot, G. Cavinato, A. Nale, Y. Herve Bang, **V. Di Noto**, Hybrid inorganic-organic proton-conducting membranes based on SPEEK doped with WO₃ nanoparticles for application in vanadium redox flow batteries, *Electrochim. Acta* **309**, 311-325 (2019), <https://doi.org/10.1016/j.electacta.2019.03.056>
- F. Bertasi, G. Pagot, K. Vezzù, A. Nale, G. Pace, Y. Herve Bang, G. Crivellaro, E. Negro, **V. Di Noto**, Lithiated Nanoparticles Doped with Ionic Liquids as Quasi-Solid Electrolytes for Lithium Batteries, *Electrochim. Acta* **307**, 51-63 (2019). doi: 10.1016/j.electacta.2019.03.167
- C. Sun, K. Vezzù, G. Pagot, A. Nale, Y. Herve Bang, G. Pace, E. Negro, C. Gambaro, L. Meda, T. A. Zawodzinski, **V. Di Noto**, Elucidation of the interplay between vanadium species and charge-discharge processes in VRFBs by Raman Spectroscopy, *Electrochim. Acta* **318**, 913-921 (2019).
- F. Invernizzi, M. Patrini, K. Vezzù, **V. Di Noto**, P. Mustarelli, Polyurethane-Based Electrostrictive Nanocomposites as High Strain-Low Frequency Mechanical Energy Harvesters, *Journal of Physical Chemistry C*, 122(37) 21115-21123 (2018), doi: 10.1021/acs.jpcc.8b04002
- G. Pagot, S. Tonello, K. Vezzù, **V. Di Noto**, A New Glass-Forming Electrolyte Based on Lithium Glycerolate, *Batteries* **4**(3), 41 (2018), doi: 10.3390/batteries4030041
- F. Bertasi, G. Pagot, K. Vezzù, E. Negro, P. J. Sideris, S. G. Greenbaum, H. Ohno, B. Scrosati, **V. Di Noto**, Exotic solid state ion conductor from fluorinated titanium oxide and molten metallic lithium, *J. Power Sources* **400**, 16-22 (2018), doi: 10.1016/j.jpowsour.2018.07.118
- K. Vezzù, A.M. Maes, F. Bertasi, A.R. Motz, T-H Tsai, E.B. Coughlin, A.M. Herring, **V. Di Noto**, Interplay Between Hydroxyl Density and Relaxations in Poly(vinylbenzyltrimethylammonium)-b-poly(methylbutylene) Membranes for Electrochemical Applications, *J. Am. Chem. Soc.*, **140**, 1372-1384 (2018) doi: 10.1021/jacs.7b10524