

# CURRICULUM VITAE

## *Personal*

Name	Hamilton Varela
Born	November 12, 1973, in Natal (RN), Brazil
Parents	Hélio Varela de Albuquerque Maria Lúcia de Oliveira Brandão

Education

- 01/1993 – 01/1998: B. E. in Chemical Engineering.  
Universidade Federal do RN (UFRN), Natal (RN), Brazil.  
Thesis Title: Oxygen Evolution Reaction in Manganese Oxide Modified Electrodes.  
Supervisor: Prof. Dr. Hélio Scatena Júnior.

03/1998 – 03/2000 Master in Science (Physical Chemistry).  
Universidade de São Paulo (IQSC/USP), São Carlos (SP), Brazil.  
Thesis Title: On the Using of Polyanilines as Cathodic Material in Secondary Lithium Batteries.  
Supervisor: Prof. Dr. Roberto M. Torresi.

04/2000 – 11/2003 Ph. D. student.  
Dept. of Physical Chemistry, Fritz Haber Institute of the Max Planck Soc., Berlin, Germany.  
Thesis Title: Spatiotemporal Pattern Formation during Electrochemical Oxidation of Hydrogen on Platinum.  
Supervisor: Prof. Dr. Katharina Krischer.



## List of Publications<sup>#</sup>

- [20] H. Varela, A. Bonnefont, K. Krischer, Trapping Electrochemical Oscillations Between Self-Organized Potential Walls, *ChemPhysChem*, 2003, in press.
- [19] K. Krischer, H. Varela, A. Birzu, F. Plenge, A. Bonnefont, Stability of Uniform Electrode States in the Presence of Ohmic Drop Compensation, *Electrochim. Acta*, 2003, in press.
- [18] A. Bonnefont, H. Varela, K. Krischer, Stationary Small and Large Amplitude Patterns during Bulk CO Electrooxidation on Pt, *ChemPhysChem* 4 (2003) 1260-1263.
- [17] H. Varela, R. L. Bruno, R. M. Torresi, Ionic Transport in Conducting Polymers/Nickel Tetrasulfonated Phthalocyanine Modified Electrodes, *Polymer* 44 (2003) 5369-379.
- [16] F. Plenge, H. Varela, M. Lübe, K. Krischer, Quantitative Modeling of the Oscillatory Electrooxidation of Hydrogen on Pt in the Presence of Poisons, *Z. Phys. Chem.* 217 (2003) 365-381.
- [15] K. Krischer, H. Varela, Oscillations and other Dynamic Instabilities in: *Handbook of Fuel Cells*, ed. by W. Vielstich, A. Lamm and H. A. Gasteiger, Chapter 46, Vol. 2, Part 6, pp. 679-701. Chichester: John Wiley & Sons, 2003.
- [14] H. Varela, K. Krischer, Deciphering the Origin of High-Order Periodic and Aperiodic Cyclic Voltammetric Responses during Oxidation Processes on Platinum, *J. Phys. Chem. B* 106 (2002) 12258-12266.
- [13] H. Varela, F. Huguenin, M. Malta, R. M. Torresi, Materiais Catódicos para Baterias Secundárias de Lítio, *Quim. Nova* 25 (2002) 287-299.
- [12] H. Varela, R. M. Torresi, E. R. Gonzalez, Aspectos relacionados à Utilização da Equação Logística Quadrática em Processos Eletroquímicos, *Quim. Nova* 25 (2002) 99-106.
- [11] P. Grauel, H. Varela, K. Krischer, Spatial Bifurcations of Fixed Points and Limit Cycles during the Electrochemical Oxidation of H<sub>2</sub> on Pt Ring Electrodes, *Faraday Discuss.* 120 (2001) 165-178.

<sup>#</sup> Numbers in bold stand for publications directly related to this thesis.

- [10] H. Varela, K. Krischer, Nonlinear Phenomena during Electrochemical Oxidation of Hydrogen on Platinum Electrodes, *Catal. Today* 70 (2001) 411-425.
- [9] H. Varela, S. L. A. Maranhão, R. M. Q. Mello, E. A. Ticianelli, R. M. Torresi, Comparisons of Charge Compensation Process in Aqueous Media of Polyaniline and Self-Doped Polyanilines, *Synth. Met.* 122 (2001) 321-327.
- [8] L. O. Peres, H. Varela, J. R. Garcia, M. R. Fernandes, R. M. Torresi, F. C. Nart, J. Gruber, On the Electrochemical Polymerization of Poly(*p*-phenylene vinylene) and Poly(*o*-phenylene vinylene), *Synth. Met.* 118 (2001) 65-70.
- [7] H. Varela, M. Malta, R. M. Torresi, Microgravimetric Study of the Influence of the Solvent on the Redox Properties of Polypyrrol Modified Electrodes, *J. Power Sources* 92 (2001) 50-55.
- [6] H. Varela, G. A. Câmara, H. Scatena Jr., E. R. Gonzalez, Reação de Geração de Oxigênio em Eletrodos de Mn<sub>2</sub>O<sub>3</sub> Suportados em Aço Inoxidável, *Quim. Nova* 23 (2000) 721-726.
- [5] H. Varela, R. M. Torresi, D. A. Buttry, Mixed Cation and Anion Transport during Redox Cycling of a Self-Doped Polyaniline Derivative in Non-Aqueous Media, *J. Electrochem. Soc.* 147 (2000) 4217-4223.
- [4] H. Varela, M. Malta, R. M. Torresi, Técnicas *in situ* de Baixo Custo em Eletroquímica: A Microbalança a Cristal de Quartzo, *Quim. Nova* 23 (2000) 664-679.
- [3] J. Lee, H. Varela, S. Uhm, Y. Tak, Electrodeposition of PbO<sub>2</sub> onto Au and Ti Substrates, *Electrochem. Commun.* 2 (2000) 646-652.
- [2] H. Varela, R. M. Torresi, D. A. Buttry, Study of Charge Compensation during the Redox Process of Self-Doped Polyaniline in Aqueous Media, *J. Braz. Chem. Soc.* 11 (2000) 32-38.
- [1] H. Varela, R. M. Torresi, Ionic Exchange Phenomena Related with the Redox Process of Polyaniline in Nonaqueous Media, *J. Electrochem. Soc.* 147 (2000) 665-670.

I would like to thank...

...Prof. Dr. Katharina Krischer for introducing me to the field of nonlinear dynamics and for her solid academic advice, constant encouragement and support during my PhD course. Her invaluable help through several long discussions made this thesis possible.

...Prof. Dr. G. Ertl for giving me the opportunity to prepare this thesis in an extraordinary scientific environment and his continuous interest in and support for my work.

...Prof. Dr. H. Baumgärtel for being my second advisor.

...Ingeborg Reinhardt for helping me in several aspects during these 42 months living in Berlin, and for correcting the manuscript.

...Prof. Dr. T. Iwasita and Prof. Dr. W. Vielstich for being my bridge between the IQSC-USP and the FHI, and their continuous support.

...Dr. M. Eiswirth, Dr. J. Christoph, Dr. A. Pinheiro, Dr. R. Schuster, Dr. J. Wintterlin, Dr. S. L. Horswell, Dr. E. R. Gonzalez, Dr. H. Scatena, Dr. S. Kuriyama, for general help and fruitful discussions.

...The former and present co-workers of Prof. Dr. Krischer's group: Dr. F. Plenge, Dr. Y.-J. Li, Dr. P. Grauel, Dr. J. Oslonovitch, Dr. A. Bonnefont, Prof. Dr. A. Birzu, for several fruitful discussions and for their friendship. The close cooperation with Florian Plenge, Antoine Bonnefont and Peter Grauel was particularly important for the development of this work.

...All the members of the groups of Prof. Dr. Rotermund and Prof. Dr. Mikhailov for helpful discussions and friendship.

...All of my family and friends in Natal, without their emotional support it would be impossible to have the peace of mind to work 7898 km (4907 miles) away from home. I would like to express my gratitude especially to my sisters, brother and the whole Araújo family for taking care of the most precious treasure I have in my life: my son.

Last but not least, I would like to thank Paula for her continuous support, patience, guidance, friendship, and love.



This work is dedicated to the memory of my parents Maria Lúcia de Oliveira Brandão (11.24.1939 - 11.17.1998) and Hélio Varela de Albuquerque (02.20.1929 - 04.07.2000) for the intellectual heritage they gave me, and to my son Hamilton Júnior for whom I hope to provide something similar.