



## Masthead – Issue 34 – April 2021

### Editors

Klaus de Geus, PhD – UFPR  
Marcelo Rodrigues Bessa, PhD – UFPR  
Daniel Henrique Marco Detzel, Dr Eng – UFPR  
Luiz Felipe Ribeiro Barrozo Toledo, DSc – Lactec  
Franklin Kelly Miguel, DSc – Copel  
Rafael Martins, DSc – Copel  
Marcos Vinício Haas Rambo, DSc – Copel

### International Board

Bryan Karney, PhD – University of Toronto – Canada  
Carlos Rufin, PhD – Suffolk University – USA  
Cosmin Marculescu, PhD – Politehnica Univ of Bucharest – Romania  
Elena Cristina Rada, PhD – University of Insubria – Italy  
Elena Magaril, PhD – Ural Federal University – Russia  
Ing Liang Wong, PhD – Glasgow Caledonian University – UK  
Isabel Soares, PhD – Universidade do Porto – Portugal  
Juan Rosellón, PhD – CIDE, DIW – Mexico, Germany  
Marco Ragazzi, PhD – University of Trento – Italy  
Mário Silva Ferreira, PhD – University of Aveiro – Portugal  
Nils-Henrik von der Fehr, PhD – University of Oslo – Norway  
Ricardo Bessa, PhD – INESC TEC - Portugal

### Editorial Board

Adriane Prisco Petry, Dr – UFRGS – Brazil  
Alexandre Rasi Aoki, Dr – Lactec – Brazil  
Aloisio Leoni Schmid, Dr – UFPR – Brazil  
Alvaro de Lima Veiga Filho, Dr – PUC-Rio – Brazil  
Ana Lúcia Rodrigues da Silva, Dr – Sinerconsult – Brazil  
Anderson Catapan, Dr – UTFPR – Brazil  
Arion Zandoná Filho, Dr – UFPR – Brazil  
Bernardo Vieira Bezerra, Dr – PSR – Brazil  
Bill Jorge Costa, Dr – Tecpar – Brazil  
Carlos Cruz, Dr – UTFPR – Brazil  
Celeste Amorim Varum, Dr – Univ. de Aveiro – Portugal  
Conrado Augustus de Melo, Dr – Unicamp – Brazil  
Dálcio Roberto dos Reis, Dr – UTFPR – Brazil  
Djalma Falcão, Dr – UFRJ – Brazil  
Dorel Soares Ramos, Dr – USP – Brazil  
Eduardo Dell'Avanzi, Dr – UFPR – Brazil  
Eduardo L Krüger, Dr – UTFPR – Brazil  
Elizete Lourenço, Dr – UFPR – Brazil  
Fernando A. de Almeida Prado Jr, Dr – Sinerconsult – Brazil  
Gilberto De Martino Jannuzzi, Dr – Unicamp – Brazil  
Hélio Pedrini, Dr – Unicamp – Brazil  
Humberto Varum, Dr – Universidade do Porto – Portugal  
Joaquim Eloir Rocha, Dr – UTFPR – Brazil  
João Marcos Lima, Dr – Enel Green Power – Brazil  
José Soares Coutinho Filho, Dr – UTP – Brazil  
Joseane Valente Gulmine, Dr – Lactec – Brazil  
Jussara M L Mattuella, Dr – Wind Energy Solutions – Brazil  
Keiko Verônica Ono Fonseca, Dr – UTFPR – Brazil  
Kleber Franke Portella, Dr – Lactec – Brazil  
Lineu Belico dos Reis, Dr – USP – Brazil  
Luiz Armando Steinle Camargo, Dr – USP – Brazil  
Luiz Augusto Nóbrega Barroso, Dr – EPE – Brazil  
Marco Delgado, Dr – ABRADDEE – Brazil  
Marco José da Silva, Dr – UTFPR – Brazil  
Marcos Antônio Marino, Dr – UFPR – Brazil  
Maria Cristina Borba Braga, Dr – UFPR – Brazil  
Mária do Carmo Duarte Freitas, Dr – UFPR – Brazil  
Marlon Leão, Dr – UNEMAT – Brazil  
Maurício Pereira Cantão, Dr – UTP – Brazil  
Nelson Kagan, Dr – USP – Brazil  
Odilon Luis Tortelli, Dr – UFPR – Brazil

Osiris Canciglieri Junior, Dr – PUC-PR – Brazil  
Paulo Silva, Dr – Universidade de Aveiro – Portugal  
Rafael Herrero, Dr – USP – Brazil  
Roberto Ziller, Dr – Infineon Technologies AG – Germany  
Sergio Scheer, Dr – UFPR – Brazil  
Sérgio Fernando Tavares, Dr – UFPR – Brazil  
Sílvia Galvão de Souza Cervantes, Dr – UEL – Brazil  
Sinclair Mallet Guy Guerra, Dr – UFABC – Brazil  
Udo Fritze Júnior, Dr – PUC-MG – Brazil  
Valma Martins Barbosa, Dr – UTFPR – Brazil  
Vitoldo Swinka Filho, Dr – Lactec – Brazil  
Walmor Cardoso Godoi, Dr – UTFPR – Brazil

### Advisory Board

Cleverson Luiz da Silva Pinto, Dr  
Cristovão Vicente Scapulatempo Fernandes, PhD  
Edilson Antonio Catapan, Dr  
Eloi Rufato Junior, Dr  
Frederico Reichmann Neto, Dr  
José Marques Filho, Dr  
Marcos de Lacerda Pessoa, PhD  
Noel Massinhan Levy, Dr  
Ruy Fernando Sant'Ana, PhD  
Thulio Cicero Guimarães Pereira, Dr

### Collaborators of this issue

Kátia Campos de Almeida – UFSC  
Luiz Fujio Kamogawa  
Marcos Antonio Coelho Berton – Inst SENAI Inovação Eletroquímica  
Renê Bettega

### Journalist

Andrea Martins Bordinhão

### Supporting Institutions

*COPEL – Companhia Paranaense de Energia*  
*UFPR – Universidade Federal do Paraná*  
*LACTEC – Instituto de Tecnologia para o Desenvolvimento*