

III - PATENTS

- III.1 V. Yu. Kukushkin, A.J.L. Pombeiro*, G. Wagner, J.J.R. Fraústo da Silva, “Platinum-mediated Synthetic Process for Δ^4 -1,2,4-Oxadiazolines”, PT 102 483 R (date: 2000/06/21). International Patent pending: PCT/PTO1/00011 (date: 2001/06/21), 01943977.7 (European) and WO 01/98283 A1 (date: 2001/12/27).
- III.2 A.J.L. Pombeiro*, V. Yu. Kukushkin, M.N. Kopylovich, J.J.R. Fraústo da Silva, “Catalyst and Synthetic Process for Carboxamides by Nitrile Hydrolysis”, PT 102 618 (priority date: 2001/05/30; award date: 2005/03/08). International Patent pending: WO 02/096856 A1 (date: 2002/12/05).
- III.3 Q.Li, A.J.L. Pombeiro*, M.F.C. Guedes da Silva, H. Lingge, “Diorgano-tin Derivatives of Aryl-hydroxamic Acids Having Anti-tumor Activity”, PT 102826 (priority date: 2002/08/07; award date: 2004/08/23).
- III.4 A.J.L. Pombeiro*, J.J.R. Fraústo da Silva, Y. Fujiwara, J.A.L. Silva, P.M. Reis, A.F. Palavra, “Catalysts and Process for the Direct Conversion of Methane into Acetic Acid”, PT 102859 (priority date: 2002/10/23; award date: 2004/08/26), WO 2004/037416 A3 (date: 2004/05/06), China (850332MP, date: 2005/06/14), Europe (“Vanadium Catalysts and a Process for the Direct Conversion of Methane into Acetic Acid”, 03748820.2-2104-PT0300015), USA (“Process for Direct Conversion of Methane into Acetic Acid”, US 7,238,838 B2, award date: 2007/07/03), Japan (2004-546574).
- III.5 A.J.L. Pombeiro*, M.N. Kopylovich V. Yu. Kukushkin, “System and Processes for the Syntheses of Imidoylamidines and Acetylammides”. PT 103017 X (priority date: 2003/09/05; award date: 2005/06/27).
- III.6 A.J.L. Pombeiro*, M.N. Kopylovich, A.M. Kirillov, “System and Processes for the Catalytic Peroxidative Oxidation, in Mild Conditions, of Cyclohexane and Cyclopentane to the Corresponding Alcohols and Ketones”. PT 103033 X (priority date: 2003/10/24; award date: 2005/10/18).
- III.7 A.J.L. Pombeiro*, J.J.R. Fraústo da Silva, J.A.L. Silva, M.V. Kirillova, P.M. Reis, A.F. Palavra, Y. Fujiwara, “Process for the Direct and Simultaneous Conversion of Ethane into Acetic and Propionic Acids”. PT 103131 Z (priority date: 2004/06/02; award date: 2006/09/29).
- III.8 A.J.L. Pombeiro*, M.N. Kopylovich, V. Yu. Kukushkin, K.V. Louzianine, “Systems and Processes for the Synthesis of Phthalocyanines and Their Complexes, Based on the Use of Oximes or Hydroxylamines, at a Low temperature and with a Good Yield”. PT 103130 Y (priority date: 2004/06/02; award date: 2006/03/22).
- III.9 A.J.L. Pombeiro*, A.M. Kirillov, M.N. Kopylovich, M.V. Kirillova, M. Haukka, M.F.C. Guedes da Silva, “New Di-, Tri-, Tetra- and Poly-nuclear Copper Complexes, and Their Use as Catalysts for the Peroxidative Oxidation of Cyclohexane”. PT 103225 (priority date: 2005/01/19; award date: 2006/03/20).
- III.10 A.J.L. Pombeiro*, M.V. Kirillova, A.M. Kirillov, J.J.R. Fraústo da Silva, “Methyl(trioxo)rhenium and Other Rhenium Oxides as Catalysts for the Carboxylation and Hydroxylation of Alkanes”. PT 103345 (priority date: 2005/09/13; award date: 2006/03/24).
- III.11 A.J.L. Pombeiro*, J.J.R. Fraústo da Silva, J.A.L. Silva, M.V. Kirillova, P.M. Reis, A.M. Kirillov, A. Palavra, “Groups 5 and 6 Metal Oxides as Catalytic Systems for Oxidative Functionalization Reactions of Alkanes”. PT 103350 (priority date: 2005/09/16; award date: 2006/03/27).

- III.12 A.J.L. Pombeiro*, J.J.R. Fraústo da Silva, J.A.L. Silva, M.V. Kirillova, “Transition Metal Catalytic Systems for High Turnover Numbers in Alkane Oxidation and Carboxylation Reactions, their Preparation and Utilization”. PT 103352 (priority date: 2005/09/20; award date: 2006/08/31).
- III.13 A.J.L. Pombeiro*, M.N. Kopylovich, A.M. Kirillov, V. Yu. Kukushkin, M. Haukka, “Method for the Preparation of New Unsymmetrical Imidoylamidine Nickel(II) Complexes bearing an Isoindolinone Moiety, Compounds thereof and Their Use as Colouring Materials”, PT 103522 (priority date: 2006/07/12; award date: 2007/03/30).
- III.14 A.J.L. Pombeiro*, A.M. Kirillov, M.N. Kopylovich, V.N. Kokozay, D.S. Nesterov, “Heterotrimetallic Fe/Cu/Co Complex, Preparation Method Thereof and Catalyst Comprising the Same for the Mild Oxidation of Cycloalkanes”, PT 103526 (priority date: 2006/07/14; award date: 2007/05/02).
- III.15 Q. Li, X. Shang, J. Wu, A.J.L. Pombeiro*, “Polymeric Complexes of Dibutyltin and Aryl- hydroximate with Anti-tumor Activity”, PT 103613 (priority date: 2006/12/07; award date: 2007/10/03).
- III.16 A.J.L. Pombeiro*, M.V. Kirillova, A.M. Kirillov, J.A.L. Silva, J.J.R. Fraústo da Silva, “Method of Conversion, under Mild Conditions and in Aqueous Medium, of Gaseous and Liquid Alkanes into Carboxylic Acids”, PT 103640 (priority date: 2007/01/18; award date: 2007/09/20). International Patent: WO/2008/088234 (date: 2008/07/24). European Patent: EP 2 125 685 B1 (date of publication: 2013/06/26, Bulletin 2013/26). Canadian Patent: 2,675,963 (classification: c07c 51/145) (date: 2014/05/30).
- III.17 A.J.L. Pombeiro*, L.M.D.R.S. Martins, E.C.B.A. Alegria, “Use of Microwaves for the Synthesis of Substituted Tris(pyrazolyl)methanes”, PT 103681 (priority date: 2007/11/02; award date: 2009/12/04).
- III.18 A.J.L. Pombeiro*, K.V. Luzyanin, V. Yu. Kukushkin, M.N. Kopylovich, “Method of 3-Iminoisoindolin-1-ones Synthesis Based on the Use of N,N-diethylhydroxylamine”, PT 103718 (priority date: 2007/04/13; award date: 2007/10/03).
- III.19 A.J.L. Pombeiro*, L.M.D.R.S. Martins, E.C.B.A. Alegria, M.V. Kirillova, “New Complexes of Rhenium with Pyrazole or tris(1-pyrazolyl)methanes and Their Application as Catalysts for the Partial Oxidation, under Mild Conditions, of Ethane to Acetic and Acetaldehyde and of Cyclohexane to Cyclohexanol and Cyclohexanone”, PT 103735 (priority date: 2007/05/11; award date: 2008/03/31).
- III.20 A.J.L. Pombeiro*, M.V. Kirillova, J.A.L. Silva, J.J.R. Fraústo da Silva, “System for the Conversion, under Mild Conditions, of Ethane and Propane in Carboxylic Acids by Using Vanadium-containing Heteropolyacid Catalysts”, PT 103814 (priority date: 2007/08/23; award date: ...).
- III.21 A.J.L. Pombeiro*, J. Lasri, M.A.J. Charmier, M. Haukka, “System and Method of Synthesis of Polysubstituted *E*-cyanolefins Based on Reactions of Nitriles with Nitrones”, PT 103888 (priority date: 2007/11/20; award date: 2009/06/23).
- III.22 A.J.L. Pombeiro*, L.M.D.R.S. Martins, E.C.B.A. Alegria, T.S.F. Silva, “Scorpionate Chloro-Complexes of Iron and Vanadium and Their Application as Catalysts for the Partial Oxidation, under Mild and Environmentally Tolerable Conditions, of Cyclohexane to Cyclohexanol and Cyclohexanone”, PT 104153 (priority date: 2008/08/04; award date: 2009/07/01).
- III.23 A.J.L. Pombeiro*, J. Lasri, M. Kopylovich, M.F.C. Guedes da Silva, R.R. Fernandes, M.A.C. Januário, “New Palladium Complexes with Bis(pyrrolidinylidene) phthalamides and Di-hydropyrrolyliminoisoindolinones, and their Application as Catalysts in Suzuki-Miyaura Coupling Reactions”, PT 104187 (priority date: 2008/09/25; award date: 2009/07/23).

- III.24 A.J.L. Pombeiro*, L.M.D.R.S. Martins, E.C.B.A. Alegria, G.S. Mishra, J.J.R. Fraústo da Silva, “Complexes of Rhenium and Pyrazole Supported on Functionalized Silica as Catalysts for the Partial Oxidation of *n*-Hexane and Cyclohexane with Dioxygen and under Environmentally Acceptable Conditions”, PT 104197 (priority date: 2008/09/30; award date: 2009/07/27).
- III.25 A.J.L. Pombeiro*, J. Lasri, M. Kopylovich, M.F.C. Guedes da Silva, S. Mukhopadhyay, R.R. Fernandes, M.A.J. Charmier, “New Palladium Complexes with Bicyclic Ligands of Hydropyrol-Oxadiazole Type, and Their Application as Catalysts in Microwave-assisted Suzuki-Miyaura Coupling Reactions”, PT 104199 (priority date: 2008/09/30; award date: 2009/08/11).
- III.26 A.J.L. Pombeiro*, A.M. Kirillov, K.R. Gruenwald, M. Haukka, “ *N*-Butyldiethanolamine Copper(II) Compounds, Preparation Method thereof and Use as Catalyst Precursors for Mild Oxidation of Cyclohexane”, PT 104264 (priority date: 2008/11/26; award date: 2010/01/19).
- III.27 A.J.L. Pombeiro*, L.M.D.R.S. Martins, T.F.S. Silva, G.S. Mishra, “Process for Conversion of Cyclohexane to Cyclohexanol and Cyclohexanone using Scorpionate Chloro-complexes of Vanadium(III or IV) as Catalysts, with Oxygen in the Absence of Solvents”, PT 104447 (priority date: 2009/03/20; award date: 2009/12/30).
- III.28 A.J.L. Pombeiro*, M. Gajewska, K.V. Luzyanin, M. F.C. Guedes da Silva, Q. Li, “New Cyclic Trinuclear Tin Complexes with Antitumor Activity bearing the Oxime-Hydroxamate Type Ligand *N*,2-di-hydroxi-5-(1-hydroxyiminoethyl)benzamide”, PT 104676 (priority date: 2009/07/20; award date: 2010/02/08).
- III.29 A.J.L. Pombeiro*, L.M.D.R.S. Martins, M.F.C. Guedes da Silva, G.S. Mishra, T.F.S. Silva, R. Wanke, “Copper(II) Complexes with Hydrophilic C-functionalized Scorpionate Ligands and Their Application as Catalysts for the Peroxidative Oxidation of Cyclohexane under Environmentally Tolerable Conditions, in Particular in Aqueous Medium”, PT 104713 (priority date: 2009/08/09; award date: 2010/09/13).
- III.30 A.M. Kirillov, P. Smoleński, Z. Ma, M.F.C. Guedes da Silva, M. Haukka, A.J.L. Pombeiro*, “Copper Complexes Bearing Iodo and Aminophosphine Ligands, Their Preparative Method and Use as Photoluminescent Materials, PT 104799 (priority date: 2009/10/20; award date: 2010/10/26).
- III.31 A.J.L. Pombeiro*, P.J. Figiel, M. Kopylovich, J. Lasri, M.F.C. Guedes da Silva, J.J.R. Fraústo da Silva, L.M.D.R.S. Martins, T.F.S. Silva, “Copper(II) Complex with 2,4-ethoxy-1,3,5-triazapentadienide Ligands and its Application, and of the 2,4-methoxy Analogue, as Catalysts for the Peroxidative Oxidation, Assisted by Microwaves and without Addition of Solvent, of Secondary Alcohols to Ketones”, PT 104884 (priority date: 2009/12/15; award date: 2011/10/26).
- III.32 A.J.L. Pombeiro*, L.M.D.R.S. Martins, T.F.S. Silva, M.F.C. Guedes da Silva, K.V. Luzyanin, M.V. Kirillova, “Oxocomplexes of Vanadium(IV-V) with Scorpionate or Pyrazol Ligands and Their Application as Catalysts for the Peroxidative Oxidation of Cycloalkanes and the Carboxylation of Gaseous Alkanes”, PT 104887 (priority date: 2009/12/15; award date: 2011/09/06).
- III.33 A.J.L. Pombeiro*, R.R. Fernandes, J. Lasri, A.M.F. Palavra, M.F.C. Guedes da Silva, J.A.L. Silva, J.J.R. Fraústo da Silva, “Palladium (II) Complexes with Oxadiazoline and Ketoimine Ligands as Catalysts of Suzuki-Miyaura Reactions in Supercritical Carbon Dioxide Medium”, PT 105634 (priority date: 2011/04/19; award date: 2013/04/26).
- III.34 B.G.M. Rocha, R.S. Chay, K. Luzyanin, V. Kukushkin, M.F.C. Guedes da Silva, A.J.L. Pombeiro, “Catalytic Process for Hydroxylation of Terminal Alkynes, in the Absence and in the Presence of Solvent, Based on Acyclic Diaminocarbene Platinum(II) Complexes”, PT 107011 (priority date: 2013/05/22).

- III.35 L.M.D.R.S. Martins, M. Sutradhar, M. F. C. Guedes da Silva, A.J.L. Pombeiro, “Oxo-complexes of Vanadium(IV-V) with Ligands Derived from Salicylaldehyde-2-hydroxybenzoyl-hydrazone and 8-Hydroxyquinoline and Their Application as Catalysts for the Microwave-assisted Peroxidative Oxidation of Secondary Alcohols to Ketones, without Added Solvent”, PT107601 (priority date: 2014/04/14; award date: 2018/08/06).
- III.36 L.M.D.R.S. Martins, M. Sutradhar, M.F.C. Guedes da Silva, A.J.L. Pombeiro, “Oxo-complexes of Vanadium(IV-V) with Ligands Derived from Salicylaldehyde-2-hydroxybenzoyl-hydrazone and 1,10-Phenanthroline and Their Application as Catalysts for the Microwave-assisted Peroxidative Oxidation of Secondary Alcohols to Ketones, without Added Solvent”, PT109463 (priority date: 2014/04/14; award date: July 19, 2018).
- III.37 L.M.D.R.S. Martins, A.P. Ribeiro, A.J.L. Pombeiro, “Process for the Microwave-assisted Conversion of Cycloalkanes to the Corresponding Alcohol-Ketone Mixtures, with Hydrogen Peroxide, and Using a Scorpionate Chloro-Complex of Iron(II) as Catalyst”, PT 107797 (priority date: 2014/07/25; award date: 2018/2/21).
- III.38 A.J.L. Pombeiro, L.M.D.R.S. Martins, A.P.C. Ribeiro, S.A.C. Carabineiro, J.L. Figueiredo, “Production process of ketones from secondary alcohols”, PT 109062 (priority date: 2015/12/29; award date: 2020/08/27); International Application PCT/PT2016/000019 (2016/12/22), International Publication WO 2017/116253 (2017/07/06); European Patent: Application EP 16831646 A (filing date: 2016/12/22), Publication EP3397609 (B1) (publication date: 2019/07/03); US Patent: Application 16/066,540 (2018-06-27), Publication US20190002384 (A1) (publication date: 2019/01/03); China Patent: Application CN20168076671 (2016/12/22), Publication CN108473405 (A) (publication date: 2018/08/31); Japan Patent: Application 2018-534699 (2018/06/26), Publication JP2019501918 (A) (publication date: 2019/04/21). Spanish Patent: Publication 2746840 (publication date: 2020/03/09).
- III.39 A.J.L. Pombeiro, L.M.D.R.S. Martins, A.P.C. Ribeiro, “Cyclohexane to adipic acid conversion process”, PT 109736 (priority date: 2016/11/11; award date: 2020/5/19). The work patented herein was selected as one of the top 6 semifinalists by the EVERIS Foundation Awards, edition 2018 (among over 1,000 applications from 21 countries).