



INSTITUTO NACIONAL DE MATERIAIS LANTANÍDICOS PARA SENSORES E MARCADORES: INCT-NANOMARCS

Apresentação

O INCT-NANOMARCS trabalha no desenvolvimento e inovação de tecnologias autossustentadas e marcadores e sensores altamente funcionais, integrando a teoria eo conhecimento prático adquiridos nas redes de cooperação anteriores e atuais do INCT-INAMI. O programa científico, que agrupa competências complementares de várias instituições nacionais, está focado no desenvolvimento de marcadores e sensores iônicos lantanídeos com grande potencial para aplicações biológicas (diagnóstico e terapias) e sinalização para segurança, antifalsificadores de cédulas (caso da interação com a Casa da Moeda do Brasil), e marcação para criminalística (caso da interação com a Companhia Brasileira de Cartuchos-CBC).

Coordenação

Coordenador: Severino Alves Junior (UFPE)

Vice-Coordenador: Gilberto Fernandes de Sá(UFPE)

Principais Linhas de Pesquisa

(1) Marcadores e sensores luminescentes; (2) Marcadores para aplicações em ensaios biológicos; (3) Terapia e diagnóstico de câncer; (4) Marcadores para resíduos de munição; (5) Desenvolvimento e aplicação de leitores ópticos, (6) Plataformas supramoleculares multifuncionais voltadas ao desenvolvimento de "Scaffolds", códigos de barras, selos de seguranças.

Resumo dos Resultados e Perspectivas

As aplicações baseadas na luminescência dos compostos com íons lantanídeos (Ln^{3+}) têm alcançado uma posição importante na sociedade moderna. Por exemplo, os fósforos de Ln^{3+} são usados em iluminação, lasers, fibras ópticas, tubos de raios catódicos, diagnósticos de raios-x, detecção de radiação (raios- e de elétrons), displays etc. Pretendemos com o INCT-NANOMARCS preparar materiais contendo íons Ln^{3+} altamente luminescentes para a produção dos chamados dispositivos moleculares conversores de luz

Principais Publicações

SOUZA, A.S.; NUNES, L.A.O.; SILVA, I.G.N.; OLIVEIRA, F.A.M.; DA LUZ, L.L.; BRITO, H.F.; FELINTO, M.C.F.C.; FERREIRA, R.; ALVES JR, S.; CARLOS, L.A.D.; MALTA, O.High-sensitive Eu^{3+} -ratiometric thermometers based on excited state absorption with predictable calibration. *Nanoscale*, v. 8, p. 5327-5333, 2016. (I.F.:7.76)

JIMENEZ-VILLAR, E.; DA SILVA, I.F.; MESTRE, V.; DE OLIVEIRA, P.C.; FAUSTINO, W.M.; DE SÁ, G.F. Anderson localization of light in a colloidal suspension ($\text{TiO}_2@\text{silica}$). *Nanoscale*, v. 8, p. 10938-10946, 2016. (I.F.:7.76)

PEDROSO, C.C.S.; CARVALHO, J.M.; RODRIGUES, L.C.V.; HÖLSÄ, J.; BRITO, H.F. Rapid and Energy-Saving Microwave-Assisted Solid-State Synthesis of Pr^{3+} , Eu^{3+} , or Tb^{3+} -Doped Lu_2O_3 Persistent Luminescence Materials. *ACS Applied Materials & Interfaces*, v. 8, p. 19593-19604, 2016. (I.F.: 7.145)

DE SOUZA, M.A.F.; CORRERA, T.C.; RIVEROS, J.M.; LONGO, R.L. Selectivity and Mechanisms Driven by Reaction Dynamics: The Case of the Gas-Phase $\text{OH} + \text{CH}_3\text{ONO}$ Reaction. *Journal of the American Chemical Society*, v. 134, p. 19004-19010, 2012. (I.F.:13.038)

DUTRA, J.D.L.; BISPO, T.D.; FREIRE, R.O. LUMPAC lanthanide luminescence software: Efficient and user friendly. *Journal of Computational Chemistry*, v. 35, p. 772-775, 2014. (I.F.:3.648).

de SÁ, G. F.; MALTA, O. L.; DONEGÁ, Celso de M.; SIMAS, A. M.; LONGO, R. L.; SANTA-CRUZ, P.; SILVA JR, E.. Spectroscopic properties and design of highly luminescent lanthanide coordination complexes. *Coordination Chemistry Reviews (Print)*, Amsterdam, v. 196, n.1, p. 165-195, 2000.(I.F.:12.994).

Patentes Registradas

Patentes concedidas:3

Patentes solicitadas:10

Rede Nacional

Universidade Federal de Pernambuco (UFPE); Universidade Federal da Paraíba (UFPB); Universidade Federal de Alagoas (UFAL); Universidade Federal de Sergipe (UFS), Instituto de Pesos e Medidas do estado de São Paulo (IPEM); Universidade de São Paulo (USP); Universidade de Brasília (Unb); Universidade Estadual de Campinas-Unicamp.

Rede Internacional

Fraunhofer Institute for Machine Tools and Forming Technology (IWU) – Germany; Institute of Low Temperatures and Structural Research of the Polish Academy of Sciences; Faculty of Chemistry, University of Wrocław – Poland; Departments of Physics and Chemistry, University of Aveiro – Portugal; Department of Chemistry, University of Turku – Finland. Universidad Autónoma de Madrid -Espanha.

Contatos

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NATIONAL INSTITUTE OF LANTHANIDE MATERIALS FOR SENSORS AND MARKERS – INCT-NANOMARCS

Presentation

INCT-NANOMARCS works in the development and innovation of self-sustaining technologies and highly functional markers and sensors, integrating the theory and practical knowledge acquired through previous and current cooperation networks of the INCT-INAMI. The scientific program, which combines complementary competences of several national institutions, is focused on the development of lanthanide ionic markers and sensors with great potential for biological applications (diagnostics and therapies) and signaling for safety, anti-falsification of notes (such as the partnership with the Brazilian Currency House - Casa da Moeda), and the marking for criminalistics (such as the partnership with the Brazilian Cartridge Company-CBC).

Coordination

Coordinator: Severino Alves Junior (UFPE)

Vice-coordinator: Gilberto Fernandes de Sá (UFPE)

Main Research Areas

- (1) Luminescent markers and sensors; (2) Markers for applications in bioassays; (3) Therapy and diagnosis of cancer; (4) Markers for ammunition residues; (5) Development and application of optical readers, (6) Multifunctional supramolecular platforms for the development of "Scaffolds", bar codes, security seals.

Results and Perspectives

Applications based on the luminescence of compounds with lanthanide ions (Ln^{3+}) have reached an important position in modern society. For example, Ln^{3+} phosphors are used in lighting, lasers, optical fibers, cathode ray tubes, x-ray diagnostics, radiation detection (γ -rays and electron beams), displays, etc. INCT-NANOMARCS aims to prepare materials containing highly luminescent Ln^{3+} ions to produce so-called light-converting molecular devices (DMCL), and to study their photoluminescent properties, with the purpose of producing markers and biosensors of high technological interest. These new luminescent materials can also be widely applied in areas such as: safety signs, traffic signs, emergency lighting, car panels, light painting, watches, dials, textile printing and optical storage.

Main Publications

SOUZA, A.S.; NUNES, L.A.O.; SILVA, I.G.N.; OLIVEIRA, F.A.M.; DA LUZ, L.L.; BRITO, H.F.; FELINTO, M.C.F.C.; FERREIRA, R.; ALVES JR, S.; CARLOS, L.A.D.; MALTA, O. High-sensitive Eu³⁺-ratiometric thermometers based on excited state absorption with predictable calibration. *Nanoscale*, v. 8, p. 5327-5333, 2016. (I.F.: 7.76)

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Registered Patents

Registered patents: 3

Filed Patents: 10

Member Institutions

Federal University of Pernambuco (UFPE); Federal University of Paraíba (UFPB); Federal University of Alagoas (UFAL); Federal University of Sergipe (UFS); Institute of Weights and Measurements of the State of São Paulo (IPEM); University of São Paulo (USP); University of Brasília (UnB); State University of Campinas (UNICAMP).

International Network

Fraunhofer Institute for Machine Tools and Forming Technology (IWU) – Germany; Institute of Low Temperatures and Structural Research of the Polish Academy of Sciences; Faculty of Chemistry, University of Wrocław – Poland; Departments of Physics and Chemistry, University of Aveiro – Portugal; Department of Chemistry, University of Turku – Finland; Universidad Autónoma de Madrid – Spain.

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