family of cationic tetra-imidazolyl phthalocyanines in the sense that it does not follow what was previously established by other authors, which may give new insights on the rational design of photosensitizers for use in aPDT. Ref: R. T. Aroso, M. J.F. Calvete, B. Pucelik, G. Dubin, J. M. Dabrowski, L. G. Arnaut, M. M. Pereira. (Submitted)

S3-29. Bacterial Cellulose-based Cell Culture Platform for Biomedical Application

Amanda Maria Claro - University of Araraquara
Dr. Hernane da Silva Barud - University of Araraquara
Dr. Mônica Rosas da Costa Iemma - University of Araraquara
Dr. Elenice Deffune - Sao Paulo State University

Cell culture platform is a versatile device that can be applied in the medical and biomedical field to investigate cellular responses to drug administration (drug screening), as disease models for the development of suitable treatments, in cell cryopreservation, and also while scaffolds in tissue engineering. Bacterial cellulose appears as an interesting support material, as it presents high biocompatibility, it exhibits three-dimensional architecture similar to the extracellular matrix through the presence of entangled nanofibrils and it shows more adequate physical and mechanical properties compared to vegetable cellulose. Due to the presence of hydroxyl groups on the cellulose surface, a wide variety of derivatives can be prepared by modifying its original functional group. In this sense, the present study aims to functionalize the surface of bacterial cellulose by chemical processes followed by the immobilization of growth factor, in order to obtain optimized cell cultures platforms.

S3-30. Low-Cost Visible Light Photocatalyst from Bimetallic Doped Clay

CHIDINMA. G. UGWUJA. [1], EMMANUEL. I. UNUABONAH. [1], NATALIA M. INADA [2], ANDREA S.S. DE CAMARGO [2]
[1] Department of Chemical Sciences, Redeemer's University, Nigeria
[2] Department of Physics and Materials Science, Sao Carlos Institute of Physics, University of Sao Paulo, Brazil

Almost two billion people today drink water mostly contaminated with feces, thus putting them at risk of contracting various waterborne diseases (WHO, 2017). Nanocomposite materials were developed from kaolinite clay, agro-waste and ZnCl2 for efficient water disinfection. Fixed-bed mode under gravity was used for disinfection process while steam regeneration method was employed to evaluate the re-usability of the most efficient composite material. We show for the first time that, doping the hybrid clay material with a binary mixture of transition metal salts (ZnCl2 and CuCl2) extends the efficiency of our prepared material. The enhanced nanocomposite materials were evaluated via the removal of both non-resistant and multidrug resistant (MDR) Escherichia coli (E. coli). Nanocomposites prepared with bimetallic salts of Cu/Zn provided the best disinfection efficiency against E. coli with a breakthrough time of 36 h for the removal of 2.32 x 107 cfu/mL whereas single metal salt nanocomposites exhibited a breakthrough time of 30 h and 25 h respectively for the same amount of E. coli. X-ray diffraction, Scanning electron microscope, Raman and Fourier transformed infrared analysis indicates the successful doping of the metal salts into the hybrid clay nanocomposites with new phases observed. UV-vis diffuse reflectance and Photoluminescence spectroscopy revealed that both Cu-doped and Cu/Zn-doped nanocomposite materials were visible-light active with the generation of reactive oxygen species while Fluorescence spectroscopy was further used to confirm that singlet oxygen was responsible for the inactivation of the test organism. Moreover, no bacteria regrowth was observed after 4-days. This long hydraulic times and the good regeneration capacity of the composite materials especially Cu/Zn-doped nanocomposites, makes them a potential functional material for development of simple point-of-use water treatment systems for water disinfection application.

S3-31. Dissolving microneedles with aminolevulinic acid for PDT – a pilot study in human skin

Michelle B. Requena 1, Layla Pires 2, Andi Dian Permana 3, Anderson Zanardi de Freitas 4, Cristina Kurachi 1, Ana Gabriela Salvio 5, Ryan F. Donnelly 3, Vanderlei S. Bagnato 1.
1 – São Carlos Institute of Physics, University of São Paulo, PO Box 369, 13560-970, São Carlos, SP, Brazil.
2 – University Health Network, Princess Margaret Cancer Center – Toronto, ON, Canada.
3 – School of Pharmacy, Queen's University Belfast, Belfast BT9 7BL, UK.
4 – Nuclear and Energy Research Institute – IPEN-CNEN, São Paulo, SP, Brazil.
5 – Skin Department of Amaral Carvalho Hospital, 17210-070, Jahu, SP, Brazil.

Photodynamic Therapy (PDT) is a therapeutic modality that has been applied mainly to skin cancer treatment. For topical PDT, the photosensitizer (PS) precursors are usually applied in a cream form. Aminolevulinic Acid (ALA) and its derivatives are the most common photosensitizer's precursors used, allowing the Protoporphyrin IX (PpIX) accumulation. One of the challenges in topical PDT for skin cancer is to increase the cream permeation to improve the success rate and treat deeper lesions. Microneedles (MNs) are minimally invasive systems already used for intradermal vaccination, delivery of systemic drugs such as antibiotics or hormones. In this study, we prepared dissolving MNs using 5% ALA concentration and 20% of Gantrez AN-139 polymer. The patch has 361 pyramidal microneedles with 500 μm high. The tests of mechanic strength, dissolution, and stability of MNs were encouraging to perform this study. Three healthy volunteers received the MNs patches on the forearm, and optical coherence tomography (OCT) images were collected showing the induced microholes in the skin after the MN removal. We compared the superficial PpIX formation of the dissolving MNs and the standard cream at 20% concentration by a fluorescence spectroscopy system. The study showed that even in lower concentration, the MNs were able to produce a similar amount of PpIX compared to the cream in the same incubation time. The results were encouraging to perform an animal tumor model to support the understanding of the PDT.

S3-32. Long-term effectiveness and HPV clearance of low and high-grade cervical lesions treated with photodynamic therapy

Natalia Mayumi Inada1*, Cynthia Aparecida de Castro1, Hilde Harb Buzzá1,
Cristina Kurachi1, Welington Lombardi2, and Vanderlei Salvador Bagnato1
1São Carlos Institute of Physics, University of Sao Paulo, Brazil
2Woman Health Ambulatory, UNIARA, Brazil

Cervical cancer is the second leading cause of female cancer in Brazil, with about 16,370 new cases estimated for each year of the biennium of 2018-2019 [1]. Persistent infection with Human papillomavirus (HPV) has been identified as the major cause of the Cervical Intraepithelial Neoplasia (CIN), a precursor of cervical cancer. The classification of CIN is based on the cellular features to discriminate dysplasia levels, being CIN 1 as mild dysplasia and CIN 2/3 as moderate or severe dysplasia. [2]. Cervical cancer can be prevented with a early CIN diagnosis and treatment [3]. After two years 15% of untreated CIN 1 could progress to CIN 2/3 and these high-grade squamous intraepithelial lesions (HSIL) should be immediately treated with excision. The present study reports the results of a controlled randomized clinical trial for CIN 1, 2/3 treatment. The follow up was performed at 30, 60, 90, 180 days, and at 2 years after PDT with colposcopy, Pap test, and biopsy in HSIL cases. CIN 1 (n = 70), CIN 2 (n = 10), CIN 3 (n = 08) and placebo group (n = 15) were treated with different protocols. The total rate of complete response was 75% for CIN 1 (2 years after PDT), 21.43% for placebo group, 67% for CIN 2 (1 year after PDT) and 62.5% for CIN 3 (60 days after PDT). The results of hybrid capture are showing a significant decrease (70-80%) in viral load. To improve the results for HSIL treatments, was coupled a laser to illuminate the endocervix.

Acknowledgments:
The authors thank FAPESP (CEPID/CEPOF 13/07276-1), CNPq and MCTI/FINEP/MS/SCTIE/DECIT (01.130430.00/2013).

S3-33. Photodynamic inactivation of planktonic and biofilm growing bacteria by imidazolyl cationic porphyrins

Carolina S. Vinagreiro a, Amanda Zangirolami b, Kate C. Blanco b, Gabriela Jorge da Silva c,d,Vanderlei S. Bagnato b, Mariette M. Pereira a
a Departamento de Química, FCTUC, Universidade de Coimbra, 3004-535 Coimbra, Portugal
b São Carlos Institute of Physics, University of São Paulo, Brazil
c,d Faculty of Pharmacy and Center for Neurosciences and Cell Biology, University of Coimbra, Polo das Ciências da Saúde, Azinhaga de Santa Comba, 3000-548 Coimbra, Portugal

The worldwide emergence of multidrug-resistant (MDR) bacteria are considered by the World Health Organization (WHO) one of the main causes of mortality by infectious diseases. It has been estimated that more than 80 % of all microbial infections are caused by formation of bacteria biofilms.[1] According to WHO recommendations, an urgent investment in R&D is essential for the development of new antibacterial entities with alternative mechanisms of action, to avoid that around 10 million people will die annually worldwide by 2050.[2,3]