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467 oral

Innovating Flexible Quantum Dot LEDs for Advanced Antimicrobial Photodynamic Therapy

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The rise of multidrug-resistant (MDR) bacteria has diminished the effectiveness of antibiotics, necessitating alternative treatments like antimicrobial photodynamic therapy (aPDT). However, aPDT adoption is hindered by the lack of suitable wearable light sources. To overcome this barrier, we developed flexible quantum dot light-emitting diodes (F-QLEDs) specifically designed for aPDT applications. By optimizing optical, thermal, and stability parameters, the F-QLEDs achieve precise emission spectrum alignment with photosensitizer absorption, maintain safe surface temperatures (< 40°C) across operating conditions, and exhibit prolonged operational and shelf-life stability in ambient air (>1 month). Biological evaluations revealed significant antimicrobial efficacy, with 1-9 log reductions in MDR pathogens, including Staphylococcus aureus, Pseudomonas aeruginosa, and Escherichia coli. Furthermore, the adaptability of F-QLEDs was demonstrated using various photosensitizers for targeted aPDT. These advancements highlight the potential of F-QLEDs as versatile, wearable optical platforms for point-of-care MDR infection treatment and other photomedical applications.

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468 Poster

Title: Idealizing Sonodynamic: the coupling problem

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Photodynamic therapy (PDT) offers advantages such as non-invasiveness, non-ionizing properties, and shorter recovery times. However, its limited tissue penetration, particularly in pigmented areas like melanoma, remains a challenge. Sonodynamic therapy (SDT) addresses this limitation by using ultrasound, which penetrates deeper and is unaffected by tissue color. Combining PDT and SDT, known as sono-photo dynamic therapy (SPDT), could enhance therapeutic outcomes. This study explores methods to manipulate ultrasound beams using metallic cones to optimize focal depth and beam distribution. Variables such as cone diameter, height, curvature, and material were tested in a water tank, with hydrophones mapping ultrasound pressure in 2D. Results showed output diameter as the most significant factor for focal depth, while cone height had moderate effects. Curvature influenced beam shape, and material impacted overall performance. These findings support the development of SDT for precise clinical applications, enabling targeted energy delivery to treated regions.

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470 Poster Highlight Presentation

A case report of photodynamic therapy-assisted surgical treatment of recurrent oral squamous cell carcinoma

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Significance: To report the efficacy of photodynamic therapy-assisted surgical treatment of recurrent oral squamous cell carcinoma.
Approach: A 71-year-old patient with left cheek squamous cell carcinoma had two recurrences in 3 years. Oral examination showed granular nodules on the surface of the left lower gingival buccal groove. The biopsy pathological diagnosis was "recurrence of left cheek squamous cell carcinomaafter surgery". Five photodynamic therapy sessions were conducted, during the period of waiting for surgical resection was performed.
Results: Postoperative pathological report: (left cheek) Severe dysplasia were showed in squamous epithelium on the surface of some areas, tending to local early canceration. The histological depth of infiltration (DOI) was about 1mm. No obvious recurrence was found in the follow-up.
Conclusions: Preoperative photodynamic therapy for oral squamous cell carcinoma can effectively control or reduce the lesion range, thereby reducing the extent of surgical resection and avoiding greater surgical trauma such as skin grafting.

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471 oral

Machine learning applied to analyses of FTIR spectrum to identification of antibiotic resistance in different species of microorganisms

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Here we develop an innovative protocol for the rapid and safe identification of antimicrobial resistance. This advance is crucial for optimizing treatment strategies and avoiding the spread of resistance. Which emphasizing the relevance of specialized machine learning bases in effectively differentiating between resistance profiles in Gram-negative and Gram-positive bacteria. We established a methodology capable of analyzing the Fourier Transform Infrared Spectroscopy (FTIR) structural profile of samples of Streptococcus pyogenes, Streptococcus mutans, Escherichia coli and Klebsiella pneumoniae, tested in a data bank of Staphylococcus aureus. It demonstrates cross-sectional applicability of antibiotic identification on different microorganisms, and providing a multidimensional database that transcends microbial variability [1–5]. The results reinforce the premise that the structural characteristics identified are universal among the microorganisms tested. The results bring a safe and quick alternative in the identification of antibiotic resistance in microorganisms. The obtained result has high potential to be applied to clinical procedures needs.

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