

# Novel Acridine Conjugates Incorporating DMF and Dansyl Amide Moieties for Multifunctional Applications in Anion Sensing, Temperature Probing, and Antimicrobial Activity Studies

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Multifunctional materials are an intriguing area of study in various advanced research fields, spanning environmental, medical, and industrial applications. One pressing issue that continues to attract significant scientific interest is antimicrobial resistance, which underscores the urgent need for innovative solutions. As a result, the development of synthetic antimicrobial agents has become a key focus of research. Among these, acridine derivatives have garnered attention for their wide range of biological applications, including anti-inflammatory, antibacterial, and anticancer activities [1]. Polymers, either inherently antimicrobial or modified to incorporate antimicrobial agents, present promising candidates for direct use in healthcare and industrial settings to control bacterial growth [2]. Simultaneously, the study of anion detection is gaining momentum, driven by the detrimental effects that negatively charged ions can have on chemical, environmental, health, and biological systems. As such, numerous methods for detecting hazardous anions, such as fluoride and cyanide, are being developed [3-4]. This research introduces the synthesis and comprehensive characterization of two novel 9-aminoacridine derivatives (L1-L2). A series of experiments, conducted in both solution and solid states, involved incorporating these compounds into biocompatible polymers like poly(vinyl alcohol) (PVA), polyvinylpyrrolidone (PVP), and polyether-based thermoplastic polyurethane. The goal was to evaluate their antimicrobial efficacy against both Gram-positive and Gram-negative bacteria. Additionally, their optical properties, including anion sensing potential and acidochromic behavior, were thoroughly investigated.

## References

- [1] R. Chen, L. Huo, Y. Jaiswal, J. Huang, Z. Zhong, J. Zhong, L. Williams, X. Xia, Y. Liang and Z. Yan, *Molecules*, 2019, 24, 2065. DOI:10.3390/molecules24112065.
- [2] G. A. Marcelo, J. Galhano, M. P. Duarte, A. Kurutos, J. L. Capelo-Martínez, C. Lodeiro and E. Oliveira, *Macromol Biosci*, 2022, 22, 2200244. DOI:10.1002/mabi.202200244.
- [3] M. K. Goshisht and N. Tripathi, *J Mater Chem C Mater*, 2021, 9, 9820–9850.
- [4] E. Thanayupong, K. Suttisintong, M. Sukwattanasinitt and N. Niamnont, *New Journal of Chemistry*, 2017, **41**, 4058–4064.
- [5] F. Duarte *et al*, *Microchemical Journal* 205 (2024) 111237. DOI: 10.1016/j.microc.2024.111237

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