



RELIANCE

**From Lab to On-Site:
Sustainable Detection of
Essential Oils using
Paper-based
Electrochemical sensors**



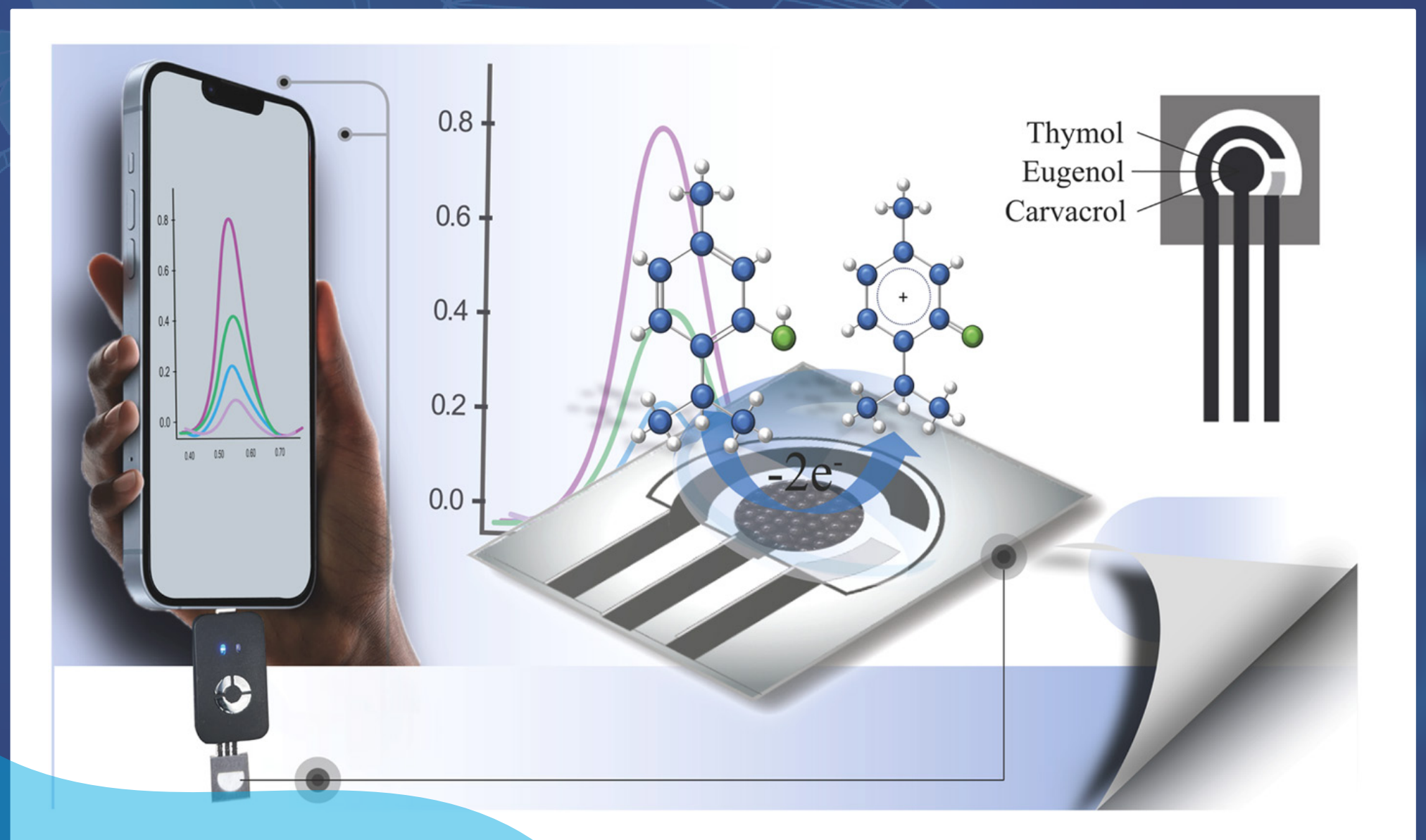
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The Challenge

The rapid growth of bio-based antimicrobial coatings requires reliable control of essential oil dosage.

Laboratory methods are costly and unsuitable for on-site routine monitoring.



The Achievements

- **First reagent-free paper sensor for detection of essential oils**
- **Analytical performance comparable to laboratory standard methods**
- **Portable format requiring only one drop of sample**



Key Conclusions

- Sustainable materials can deliver high analytical performance
- On-site testing reduces dependence on centralized facilities
- Eco-designed sensors can lower energy use and chemical waste



Recommendations



Industry: Implement routine monitoring of natural antimicrobials using portable, low-waste analytical tools.



Researchers: Integrate sustainable detection methods into safe-and-sustainable-by-design development.



Policymakers: Encourage greener testing methods when evaluating bio-based antimicrobial solutions.

Who is this result for?

- Companies producing antimicrobial nano-coatings who need to measure essential oil content
- R&D teams adjusting essential oil dosage in functional surfaces
- Laboratories performing routine testing of coated materials
- Authorities checking compliance of bio-based antimicrobial products



Long-term Impact



Reliable measurement of essential oils supports the safe use of bio-based antimicrobial coatings.



Portable, paper-based, low-cost and low-waste monitoring for wider market adoption, and greener industry practices and guidance in standards and policy.



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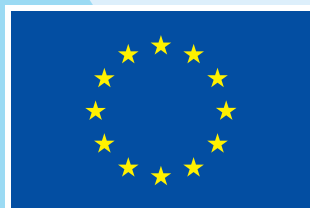
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