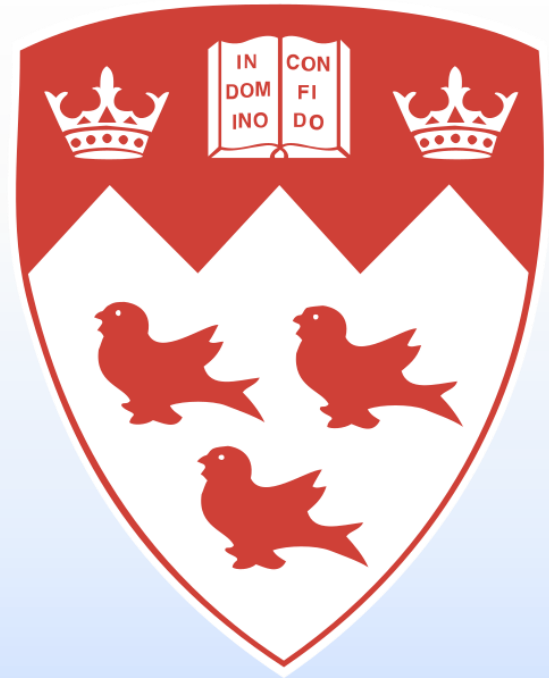


Development of a loop mediated isothermal amplification (LAMP) – surface enhanced Raman spectroscopy (SERS) assay for the detection of *Salmonella enterica* serotype Enteritidis



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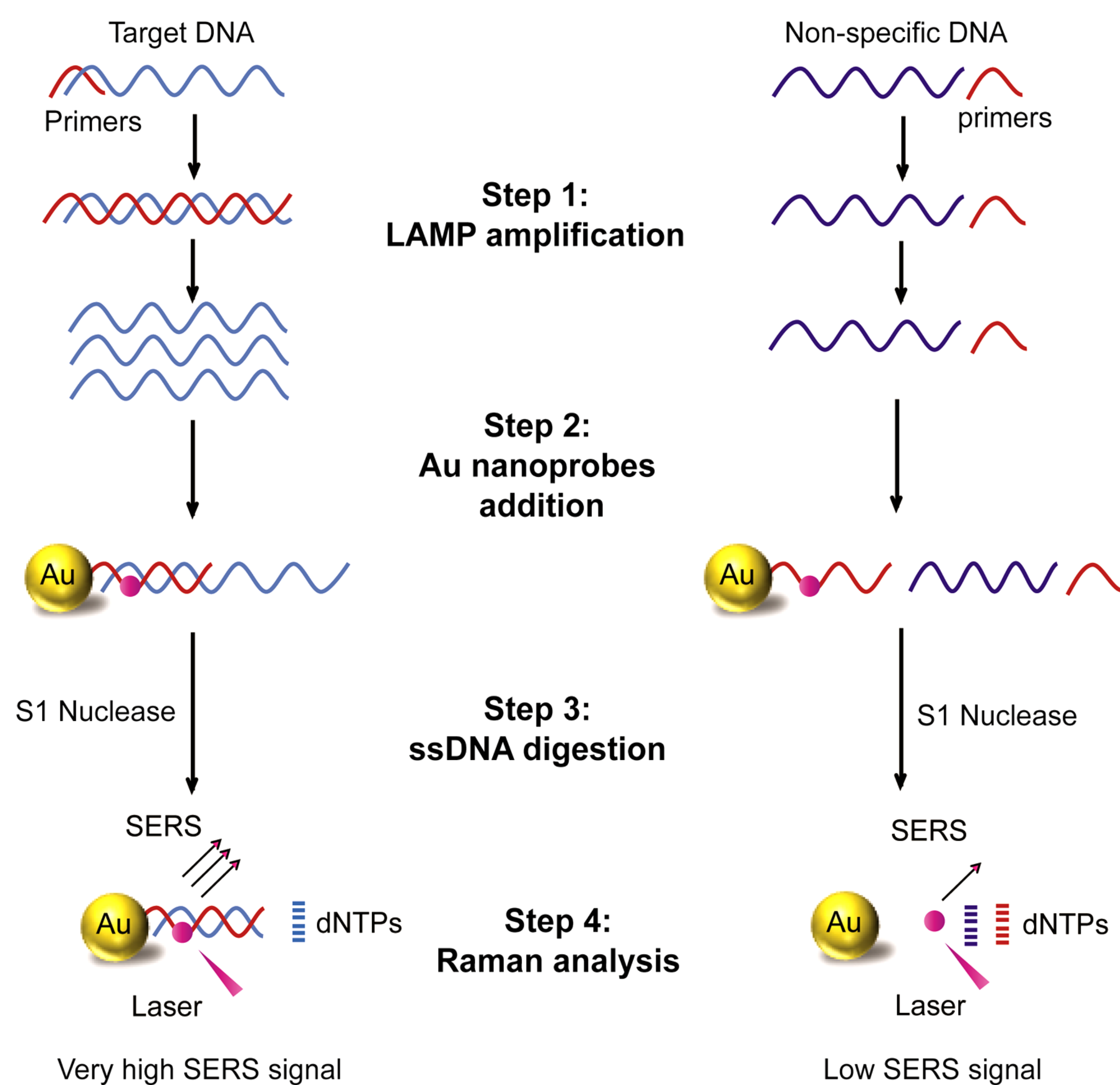
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Introduction

- *Salmonella* is one of the major foodborne pathogens that can cause significant human diseases.
- Conventional methods for the detection of *Salmonella* include various cultural, biochemical, and immunological methods, but they are labor intensive and time consuming.
- We developed a rapid and reliable assay integrating LAMP and SERS to detect *Salmonella enterica* serotype Enteritidis.

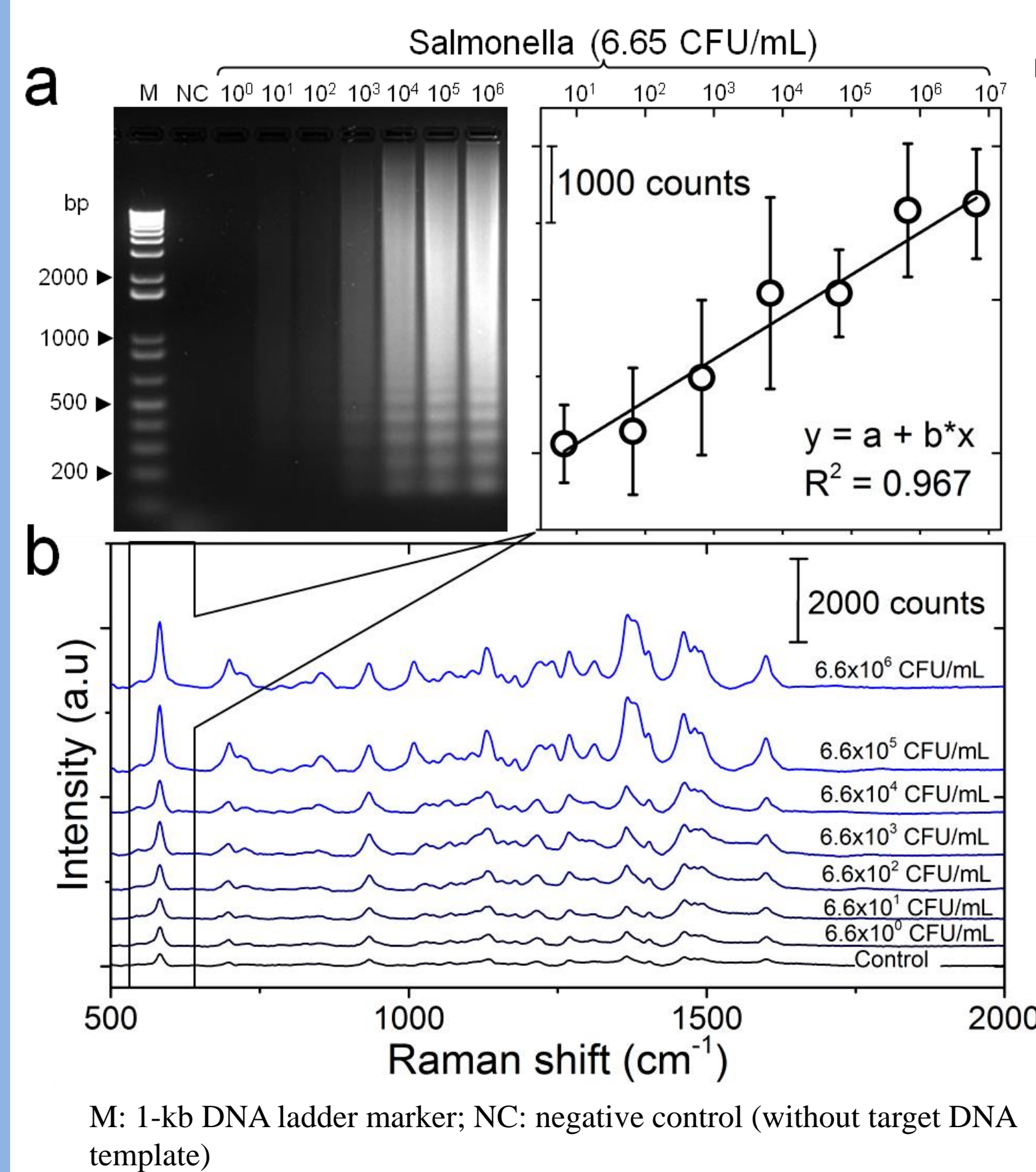
Materials and methods



Acknowledgements

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- L.X. received a scholarship from China Scholarship Council (CSC).

Results

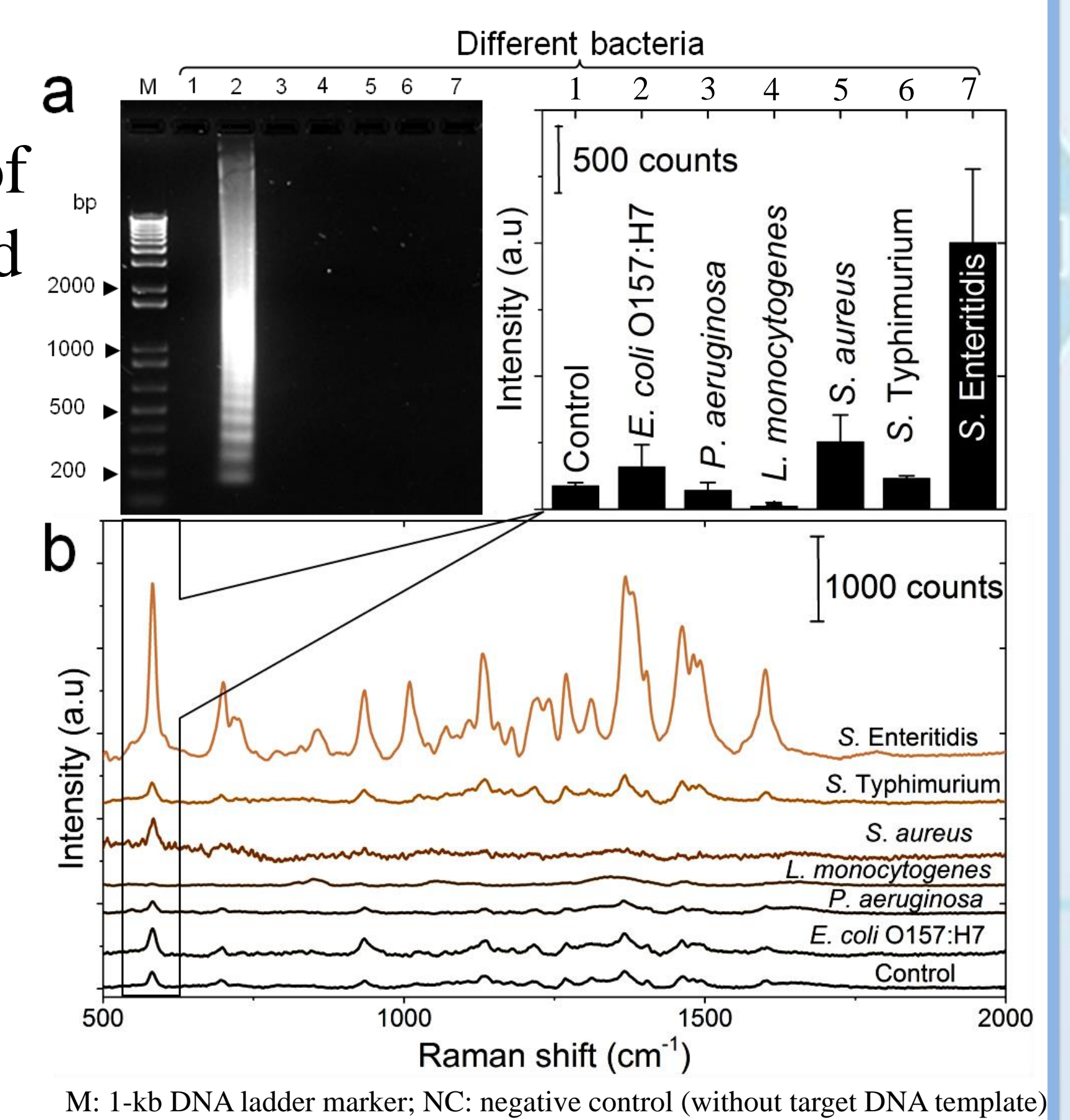


Sensitivity test

- Successful LAMP amplification of diluted DNA template (6.6-6.6x10⁶ CFU/mL) was confirmed by gel electrophoresis.
- The limit of detection for LAMP-SERS assay was 66 CFU/mL.
- The SERS intensity was directly proportional to the initial concentration of the target DNA, indicating the potential application of the developed assay for quantitative detection.

Specificity test

- The electrophoretic analysis of the LAMP products confirmed that the characteristic ladder bands of LAMP were only observed with the target *S. Enteritidis*.
- A significantly high SERS signal was observed for the target *S. Enteritidis* compared to that of all other bacterial strains, even the closely related *S. Typhimurium*.



Conclusion

- We have demonstrated the feasibility and usefulness of a new LAMP-based nucleic acid detection using Raman spectroscopy.
- LAMP-SERS had the limit of detection of *S. Enteritidis* at 66 CFU/mL and was ~100-fold more sensitive than that of PCR.
- This integrated assay could differentiate *S. Enteritidis* from a mixture including closely related bacterial species.
- The applicability of LAMP-SERS for sensing food contamination was verified by detecting *S. Enteritidis* in milk.
- The proposed assay has a great potential for broad applications in DNA detection in the area of clinical diagnosis, foodborne pathogen detection, and environmental monitoring.