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High capture efficiency of lectin surfaces for *Cryptosporidium parvum* biosensors

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Note: work was performed at 1, the authors are now at 2 and 3 respectively.

HIGHLIGHTS

- Characterisation of lectin immobilisation strategies
- Use of lectins for high efficiency pathogen capture
- Lectin immobilisation better under static conditions

ABSTRACT

Detection of waterborne pathogens, such as *Cryptosporidium*, is essential for ensuring drinking water safety. Biosensors are one emerging technology aiming to improve the existing time-consuming and expensive monitoring approach. Surface functionalisation is a key aspect of biosensor development and here we propose that lectins offer an excellent alternative to antibodies offering a higher capture efficiency for oocysts. We also demonstrate that lectin immobilisation using a protocol of 11-mercaptoundecanoic acid followed by EDC-sulfo-NHS results in superior performance, compared to three other common surface functionalisation protocols, achieving an 86% capture efficiency. We also determine that capture efficiency with lectin surfaces is enhanced by the use of static conditions, in contrast to previous work with antibodies where surface capture was improved by convective conditions. These results will be highly useful in guiding the development of new biosensor systems for protozoan pathogen detection.