

Design and evaluation of an *Escherichia coli* biomarker for indication of pH

Measuring pH is one of the most commonly used techniques in both the laboratory as well as the field due to its importance in a multitude of biochemical processes. Traditional methods of measuring pH may be highly developed in accuracy and precision but often involve disruption of the environment. Biological markers offer an alternative that allows for long-term pH monitoring. This innovative approach allows for vast applications such as in the manufacturing, food processing and research industries. Under moderate acidic conditions, the *asr* (acid shock RNA) gene is highly inducible and has been demonstrated to be crucial for growth at high acidities. The *alx* locus in *E. coli* contains a putative transporter preceded by a pH-induced riboregulator that operates under moderately alkaline conditions. In this study, vivid blue/purple and green/blue chromoproteins, *cjBlue* and *amilCP* respectively, were used as visual indicators. DH5 α competent *E. coli* cells were transformed with recombinant plasmids containing either *amilCP* downstream the *asr* promoter or *cjBlue* downstream the *alx* promoter and 5'UTR, giving rise to the *alx-cjBlue* and *asr-amilCP* cell lines. Through this methodology, we were able to create strains of *E. coli* that expressed either a blue or blue-green chromoprotein under low or high pHs respectively.