Bacterial cellulose is a good candidate for use as a reinforcing agent in biodegradable polymers. Bacterial cellulose, produced by Gluconacetobacter xylinus exists as a network of randomly assembled ribbon-shaped fibrils as shown in Figure 1. Bacterial cellulose can be easily manipulated by changing the culture conditions\textsuperscript{1,2}, and altering the composition of the growth medium can lead to changes in yield, structure and morphology of the bacterial cellulose produced\textsuperscript{3}, resulting in \textit{in situ} modifications.

In this work we report the inclusion of additives to Hestrin-Schramm\textsuperscript{4} media such as hydroxypropylmethyl cellulose (HPMC), Tween 80 and xylan, and show that they led to increased fibril widths (Figure 2), whereas if dithiothreitol and chloramphenicol were incorporated in the medium, thinner fibrils resulted (Figure 3). The general appearance of the cellulose was also affected by the inclusion of additives in the medium. HPMC as an additive resulted in particularly straight fibrils (Figure 2), whereas chloramphenicol caused an unusual appearance, with spherical shaped bodies on the fibrils (Figure 3). The inclusion of poly(3-hydroxybutyric acid) (PHB) in the growth medium at a range of concentrations led to thick and tough pellicles at higher concentrations of PHB. SEM micrographs (Figure 4) of this cellulose revealed a less porous surface when compared to cellulose grown in the absence of PHB. It is hypothesized that this material will have an increased compatibility to PHB for further composite work. Crystallite size and relative crystallinity were also examined.

Using cellulose produced from the determined media, PHB/bacterial cellulose composites were produced using solvent cast methods and characterized.

\textbf{Figure 1.} SEM micrograph of bacterial cellulose.  
\textbf{Figure 2.} SEM micrograph of bacterial cellulose grown in a medium containing HPMC.  
\textbf{Figure 3.} SEM micrograph of bacterial cellulose grown in a medium containing chloramphenicol.  
\textbf{Figure 4.} SEM micrograph of bacterial cellulose grown in a medium containing dissolved PHB.

\textsuperscript{2} W. Czaja, D. Romanovicz, R.M. Brown, \textit{Cellulose}, 2004, 11, 403-411  