Synthesis and first antibacterial activity of new gaiacol-based polymers

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Preparation of new surfaces to fight against microbial contamination is a subject of major interest nowadays in different areas such as household, industry, hospital, etc. Polymer surfaces with anti-adhesive or antibacterial properties would be of great interest for example to manufacture sheets and clothes as protections against nosocomial infections. In our lab, we currently prepare new polymers based on biomolecules such as carbohydrates, essential oils, etc [1-3]. One of our major interest is to follow the antibacterial activity all along the chemical pathway starting from an initial antibacterial biomolecule till the final polymer. In this work we have focused on one of these biomolecules : gaiacol 1 (Figure 1).

Figure 1 Chemical formulae of gaiacol and monomers.

The first step was the synthesis of monomers derived from gaiacol. Chemical pathways to obtain N-(4-hydroxy-3-methoxy-benzyl)acrylamide 2, N-(4-hydroxy-3-methoxy-benzyl)methacrylamide 3 and O-gaiacyl-methacrylate 4 will be commented. Then polymers were mainly obtained by free radical polymerization. Controlled radical polymerization of these monomers by ATRP was also studied because those monomers are intended to be grafted on polymer surfaces by ATRP using a method that we used recently [4]. Microbiological tests were carried out by using planctonic tests, anti-adhesion tests and anti-biofilm tests against B. subtilis. Anti-adhesive and anti-biofilm activities were tested after adsorption on glass slides. Works in progress concern the grafting of these monomers on polymer surfaces to compare the antibacterial properties.