

## Understanding the molecular mechanism of lignin adhesion using self-assembled monolayers

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Lignin has been spotlighted as an abundant bio-renewable resource for material technology and industry such as biofuels, binders, composites, and nanomaterials for drug delivery. Despite the high potential for applications, only a few amounts of lignin have been used due to the lack of fundamental studies, particularly, its molecular interaction mechanism. Hence, probing specific lignin binding mechanism is significant for more advanced development of lignin as a practical product. Herein, a surface forces apparatus (SFA) was used to investigate molecular interaction between lignin nanofilm and five different functionalized self-assembled monolayers (SAM) with various pH conditions. The force-distance curves between lignin and CH<sub>3</sub>-SAM showed similar aspect to the profiles between lignin nanofilms. Furthermore, the lignin exhibited the strongest adhesive properties to NH<sub>2</sub>-SAM coated surface. It indicates that the molecular interaction of lignin strongly depends on hydrophobic and cation- $\pi$  interaction. Consequently, these results could provide quantitative database of lignin interactions which can support potential of lignin as useful eco-friendly bio-materials.