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## Development of glycol-lignin derivatives for high performance hybrid materials

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Lignin is one of the natural resources contained in coniferous trees up to 30% in weight, but it has not been utilized as a useful material up to now in contrast to the wide application of celluloses. Recently Dr. Yamada has invented “glycol-lignin”, which is soluble materials directly derived from coniferous tree chips by the solvolysis with oligo-ethylene glycol. We have developed hybrid film materials with the glycol-lignin and clays which have excellent properties such as insulation, gas barrier, surge resistance and so on as well as thermal stability, and which are now applied as gasket packings FRP matrices and so on. In order to improve the film properties and processability of the glycol-lignin, we prepared several derivatives of the glycol-lignin. Phenolic hydroxyl groups and the hydroxyl groups of ethylene glycol chains on the glycol-lignin were determined as 1.89mmol/g and 2.35mmol/g, respectively based on the acetylation method. Then several functional groups such as diisocyanates, dianhydrides, chlorides, epoxides and so on were introduced on the active hydroxyl moieties to the materials. Introduction of (di)anhydrides afford the material water-solubility which improved the fabrication process so much. Addition of diisocyanates gave water-containing-elastic gelly materials. Thus chemical modification of the glycol-lignin has opened a door to the wide application of the materials from the view point of sustainable engineering.

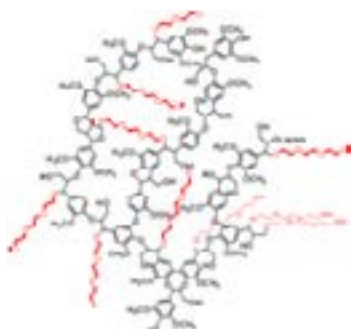


Figure 1: Structure of glycol-lignin

### Biography

Takashi Yamashita had been graduated from The University of Tokyo in 1984, then he had gotten Ph., D. from the University of Tokyo. He had worked for the University of Tokyo, Tokyo University of Science, and then he moved to Tokyo University of Technology in 2014 as the Department Head. His research interests cover development of photo-functional materials such as molecular machines, development of functional polyimides, development of the materials with nano-structure, fundamental theory on solid state photochemistry, and development of bio-mass materials. He had received Award of Photopolymer Science and Technology, and so on.

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