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Reducing lignocellulosic recalcitrance by introduction of chemically labile linkages into the lignin backbone

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Unlike annual herbaceous plants, which have a single-year generation cycle, perennial woody plants have an excellent ability to stably store carbon dioxide fixed through photosynthesis. In addition, the solid density in woody plants is much higher than that of grass monocots, which grow quickly but have many voids, and the moisture content of aged wood (wood), which is the main solid content, is relatively low. There is a low risk of deterioration due to rot after harvest. These properties of woody biomass are advantageous for long-term storage after harvesting and long-distance transportation, and are properties suitable for use as raw materials for various industries.

On the other hand, since wood contains 20 to 30% of its weight in lignin, an aromatic polymer, it is generally more durable and hard in shape than other biomass such as rice straw, and is difficult to handle due to physical and chemical treatments. For efficiently recovery of polysaccharides from wood, which are the main raw materials for the production of liquid fuels through fermentation and for the production of chemical substitutes such as fibers, it is usually necessary to separate polysaccharides and lignin under high temperature and pressure. In order to realize a carbon-negative society, in addition to creating herbaceous and woody plants that grow fast and increasing the production of plant biomass itself, it is also necessary to reduce greenhouse gases emitted during biomass processing. Furthermore, it is possible to improve the efficiency of processing from both the methods used for processing and the raw materials to be processed.

Under the background described above, we are conducting research and development with the aim of contributing to improving the processability of biomass by modifying the molecular structure of lignin contained in wood biomass.

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