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Application of underwater discharge shock wave to wood beating process as a pretreatment of enzymatic saccharification for cellulosic ethanol production FUMIYOSHI TOCHIKUBO, RYO OOHATA, YUSUKE NAKAGAWA, SATOSHI UCHIDA, Tokyo Metropolitan University — Cellulosic ethanol is expected as a renewable biomass fuel alternative to petroleum fuel. The cellulosic ethanol is obtained by saccharifying cellulose and fermenting the produced sugar. However, wood saccharification is not easy since wood is physically and chemically robust due to the hydrogen bond existing between cellulose polymers. Various wood saccharification methods have been studied. Although enzymatic saccharification has little environmental impact, its saccharification rate is slow. Therefore, the pretreatment is generally added to increase the surface area of wood for efficient enzyme reaction. In this work, we applied underwater discharge shock wave to wood powder in order to break the hydrogen bond between cellulose polymers. Underwater discharge shockwave was generated by applying a pulsed high voltage through spark switch to pin-to-pin electrodes in wood-powder disperse water. When the wood powder was irradiated with the shock wave, the volume of wood powder was increased. The increase of powder volume strongly suggests that water molecules penetrate between cellulose polymers as a result of wood beating. The wood powder treated by the shock wave was applied to enzymatic saccharification. We confirmed the increase of saccharification rate by enzyme.

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