様式

論　文　内　容　の　要　旨

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In doctoral thesis of study on ultrasound (US) stimulated release of medicine from biomass polymer hydrogels is described for the effect of US exposure conditions, different polymer concentrations, and different drug concentrations on the drug release. The following five chapters are included.

In Chapter 1, the general information of smart drug delivery and release systems including hydrogel is overviewed. US stimuli are introduced to fully understand the background of this thesis.

In Chapter 2, for US stimulated release of mimosa medicine from cellulose hydrogel matrix, mimosa medicine is introduced into cellulose hydrogel matrix and the US is exposed to the hydrogel. The results showed that the mimosa release efficiency increased, when increasing the US power or decreasing the cellulose concentration. Moreover, the hydrogel became somewhat rigid after the US exposure, meaning that the hydrogen bonds in the mimosa-water and mimosa-cellulose of the hydrogel were broken during the US exposure. It was suggested that the US exposure improved the mimosa release efficiency.

In Chapter 3, for US stimulated release of gallic acid from chitin hydrogel matrix, the release efficiency of drug gallic acid from chitin hydrogel matrix is mentioned. The results showed that the release efficiency of gallic acid was increased with increasing US power, gallic acid loading amount, and decreasing of the chitin concentration. The result of viscoelasticity demonstrated that the US exposure rigidified the hydrogel matrix. FT-IR data suggested that the hydrogen bonds in the GA-chitin hydrogels were broken by US exposure. As a result, the US exposure increased the release of gallic acid from chitin hydrogel matrix.

In Chapter 4, for US effect on cellulose decomposition in solution and hydrogels, the effect of US exposure on cellulose decomposition is studied under different US frequencies and powers. Results showed that the cellulose was depolymerized effectively under higher US frequency and power. The depolymerized phenomenon was more significantly, when lower molecular weight of cellulose was used. In addition, the cellulose in solution was much easier to decline the molecular weight by the US exposure, when the hydrogel depolymerization was compared.

In Chapter 5, this thesis was summarized.