Ultra high pressure (UHP) infusion of fluorescein to starch

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Most of current Drug Delivery System (DDS) and Nutrient Delivery System (NDS) are using nanotechnology, but they are expensive and have many side effects. Therefore, it is very important to develop new DDS and NDS with no side effect with low cost. The objective of this study was to investigate the effect of ultra-high pressure on infusion efficiency of fluorescein to starch to develop new DDS and/or NDS. Corn, waxy rice, non-waxy rice, potato starch were used as carrier materials. Fluorescein was used as an infusion material for easy detection. At atmospheric pressure, each starch suspension with fluorescein was reacted in a water bath for 30min. For UHP infusion, samples were reacted at 400–600MPa for 15min at room temperature. After reaction, fluorescein concentration of supernatant was measured using fluorescent detector and fluorescein infused starch was observed using confocal laser scanning microscopy. Fluorescein did not infuse in all starches except waxy rice and corn starches. Concentration of fluorescein in supernatant of corn and waxy rice starches at 60°C decreased about 60% suggesting that 60% of fluorescein infused in those two starches. For UHP infusion, there was 30% increase in infusion efficiency compared to samples infused at atmospheric pressure. Those two starch granules are luminous by green light when exposed to fluorescent detector. Corn and waxy rice starches were the best carrier materials among samples in this case. UHP infusion showed the potential for infusion technology with relatively less energy and short time for developing new DDS and NDS system.