Abstract:
Ethanol production at high-gravity promise to achieve concentrations over the threshold for an economical distillation process and concurrently reduce water consumption. However, a persisting limitation is the poor mass transfer conditions resulting in low ethanol yields and concentrations. Hereby, the combination of an acetone/water oxidation pretreatment process (AWO) with a liquefaction/saccharification step, using a free-fall mixer, before simultaneous saccharification and fermentation (SSF) can realize ethanol concentrations of up to ca. 74 g/L at a solids content of 20 wt%. The free-fall mixer achieved a biomass slurry viscosity reduction by 87% after only 2 h of enzymatic saccharification, indicating the efficiency of the mixing system. Furthermore, the direct enzymatic treatment of AWO pretreated corn stover (CS) by a GH11 recombinant xylanase, led to the production of xylooligosaccharides (XOS) with prebiotic potential and the removal of insoluble fibers of hemicellulose improved the glucose release of AWOCS by 22%.