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**Preferred mode of presentation:** Oral

**Experimental investigation of granule shape and size dynamics in twin-screw granulation**

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Twin-screw granulators (TSG), being promising in the context of continuous high shear wet-granulation (HSWG), achieve mixing by arrangement of transport and kneading element modules producing a certain granule shape and size distribution (GSSD). However, the primary shaping mechanism behind this distribution is not well understood due to the opacity of the multiphase system. This study experimentally characterised the change in GSSD and dynamics along the TSG length in order to understand the function of individual screw modules and their interaction. Dynamic image analysis (DIA) was performed to evaluate the changes in size and morphology of granules sampled from different locations on the screws. The study suggested significant heterogeneity in GSSD between the different samples. At low liquid-to-solid ratio, the first kneading module played a more significant role in mixing whereas the second kneading module was more involved in reshaping the granules. At high liquid-to-solid ratio aggregation took place in the second kneading module changing the GSSD. Results from this study are important for better understanding of the key mechanisms of HSWG using TSG, essentially required for physical modelling and control of the process. To the best of our knowledge it is the first time such experiments have been performed.

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