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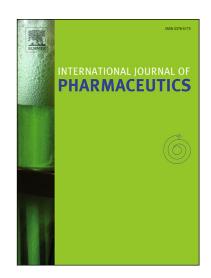
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In-line agglomeration degree estimation in fluidized bed pellet coating processes

using visual imaging

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Abstract

Agglomeration of pellets in fluidized bed coating processes is an undesirable phenomenon that affects the yield

and quality of the product. In scope of PAT guidance, we present a system that utilizes visual imaging for in-line

monitoring of the agglomeration degree. Seven pilot-scale Wurster coating processes were executed under various

process conditions, providing a wide spectrum of process outcomes. Images of pellets were acquired during the

coating processes in a contactless manner through an observation window of the coating apparatus. Efficient image

analysis methods were developed for automatic recognition of discrete pellets and agglomerates in the acquired

images. In-line obtained agglomeration degree trends revealed the agglomeration dynamics in distinct phases of

the coating processes. We compared the in-line estimated agglomeration degree in the end point of each process

to the results obtained by the off-line sieve analysis reference method. A strong positive correlation was obtained

(coefficient of determination $R^2 = 0.99$), confirming the feasibility of the approach. The in-line estimated

agglomeration degree enables early detection of agglomeration and provides means for timely interventions to

retain it in an acceptable range.

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