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Section
Materials Processes

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Section Information

The Materials Processes section of the Processes journal covers research topics on the manufacturing, processing, and degradation of materials, as well as processes that occur within materials. It publishes studies that incorporate quantitative characterization, analysis, modeling/computation, and process systems engineering approaches including design, optimization, and control. There is no limit on the material type. In addition to original research contributions, review papers are welcome. Every manuscript submitted for publication under this section should meet publishing ethical standards of the Processes journal. No manuscript is published without undergoing peer review. When a manuscript is accepted, it is published rapidly online in a fully open access format.

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Drexel University, USA

Subject Areas

Materials

- Agricultural materials;
- Air products;
- Biomaterials;
- Colloids;
- Crystallization;
- Energy materials;
- Food materials;
- Health materials;
- Nanomaterials;
- Petroleum;
- Petrochemicals;
- Pharmaceuticals;
- Polymers;
- Semiconductors;
- Sustainability materials;
- Water.

Processes

- Chromatography and adsorption;
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- Distillation;
- Drug delivery;
- Electrochemical systems;
- Food processing;
- Interfacial processes;
- Pharmaceuticals;
- Reactors;
- Roll-to-roll processes;
- Separation.

Selected Papers

Immobilization of Laccase on Hybrid Super-Structured Nanomaterials for the Decolorization of Phenolic Dyes

Authors: Michaela Patila, Panagiotis E. Athanasiou, Lampros Kortessis, Georgia Potsi, Antonios Kouloumpis, Dimitrios Gournis and Haralambos Stamatis

Abstract: In the present work, hybrid super-structured nanomaterials were synthesized by the combination of smectite nanoclays with various carbon-based nanomaterials (graphene oxide, carbon nanotubes and adamantylamine) and were used as nanosupports for the covalent and non-covalent immobilization of laccase from *Trametes versicolor* (TvL). TvL was successfully immobilized on these hybrid nanomaterials, achieving high immobilization yields (up to 85%), while its conformation remained unaltered upon immobilization. The apparent kinetic constants V_{max} and K_m of the immobilized enzymes strongly depended on the immobilization procedure and the composition of hybrid nanomaterials. Immobilized TvL preserved up to 50% of its initial activity after 24 h of incubation at 60 °C, while free enzyme was totally deactivated. The TvL-hybrid nanomaterials bioconjugates were efficiently applied for the degradation of various synthetic dyes, exhibiting excellent decolorization capacity, as well as high reusability (up to 11 successive catalytic cycles), providing insights into the use of these bionanoconjugates on applications with environmental, and industrial interest.

https://doi.org/10.3390/pr10020233

Mechanism of Particle Agglomeration for Single and Multi-Nozzle Atomization in Spray Drying: A Review

Authors: Ireneusz Zbicinski, Krzysztof Ciesielski and Bangguo Ge

Abstract: This paper reviews experimental works on the effects of single nozzle location and multi-nozzle atomization on the mechanism of particle agglomeration in spray drying. In addition to the naturally occurring primary agglomeration, forced and secondary agglomeration is observed as an effect of different nozzle positions or multiple-nozzle atomization in spray drying. Particle size diameters in the spray drying process for atomization from a single nozzle located at the top of the tower are larger than at the bottom of the tower because of the lower ambient air temperatures and longer residence time in the agglomeration zone. The trend of reduction in particle size is observed in all analyzed works when the nozzle is moved down towards the air inlet, due to droplets' exposure to higher air temperatures and shorter residence time in the drying chamber. Conditions of droplet–droplet, dry–dry or sticky–dry collisions leading to the development of coalescence, agglomeration and rebound zones for multiple-nozzle atomization are described and discussed. Typically, log normal PSD was found for single-nozzle spraying whereas for multi nozzle arrangement, bi-modal particle size distribution was found both for drying in lab and industrial scale.

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