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Comparison of solid, liquid and powder forms of 3D printing techniques in membrane spacer fabrication

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Abstract

Feed channel spacers in a spiral wound membrane module are net-like structures that influence the hydrodynamics of the feed channel to improve the mass transfer, thus reducing the effect of concentration polarization. Common issues associated with feed channel spacers include the trade-off between mass transfer and pressure loss as well as their impact on membrane fouling. Prior studies mainly focused on optimising the geometry and orientation of spacers. 3D printing techniques have been used to fabricate novel spacer with complex geometries that were limited by conventional manufacturing methods. Nevertheless, 3D printing is not perfect, for example, not all design features can be additive manufactured with accuracy. 3D printing can also inadvertently result in different surfaces and geometry deviations of the spacers. This study investigates different 3D printing