

Different Dispersion Protocols for an Antimicrobial Coating Additive

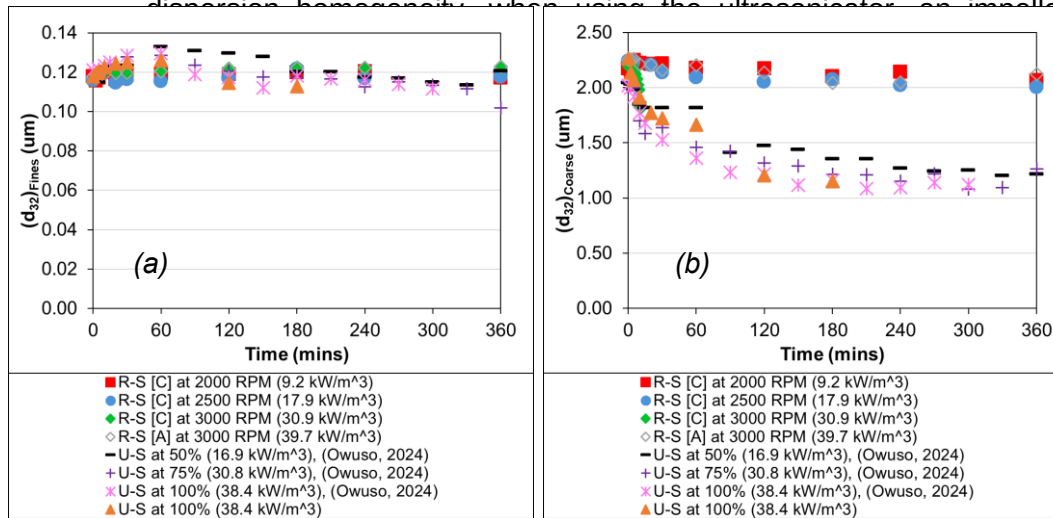
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Challenges of global dimension experienced in the recent years have highlighted the need to develop new coatings with antimicrobial properties, in particular for use in areas of dense populations, such as hospitals, schools, in public transport to minimise the risks of spreading diseases in the community. New formulation coatings with antimicrobial additives, in the form of dispersions of nanoparticles such as titanium dioxide, silica, show potential as an effective means to minimise the rapid spread in high traffic areas and difficult-to-clean surfaces. This study has been performed with titanium dioxide dispersions, the objectives to determine the kinetics and mechanisms of deagglomeration as well as dispersion fineness.

A batch rotor-stator (VMI Turbomixer) with two different mixer heads and an ultrasonic processor (Hielscher UP200S) were used as energy intensive devices to prepare 10% w:w titanium dioxide (Evonik Ind.) dispersions in deionised water at a pH of about 3.

The dominant mechanism of deagglomeration was found to be erosion. Dispersion fineness was determined by the size of aggregates, which was around 120 nm, regardless of the operating procedure (Figure 1.a). Deagglomeration kinetics was enhanced by increasing the power input- an effect that was more prominent with the ultrasonic processor. Overall, the kinetics was significantly faster when using the ultrasonicator (Figure 1 b) and complete deagglomeration could be achieved. Whilst the rotor-stator was sufficient to ascertain dispersion homogeneity, when using the ultrasonicator, an impeller was required. Final



risons with silica

Figure 7: Evolution of fines (a) and coarse (b) Sauter mean diameter of TiO_2 under various deagglomeration protocols.