Aggregation and antimicrobial properties of amino acid-based surfactants in aqueous solution

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Amino acid-based surfactants, which show excellent adsorption and aggregation properties, low potential toxicity and broad biological activity, are among the most important class of bio-based surfactants [1]. In the present work, aggregation and antimicrobial properties of amino-acid based hydrogenated dodecylesters (DDEs) and partially fluorinated octylesters (PFOEs) of alanine and serine were studied. The antimicrobial activities of the esters were determined via the inhibition zone diameter of the prepared amino-acid based esters, which measured against strains of three Gram-positive and seven Gram-negative bacteria. It was found that the DDEs of alanine and serine showed a quite good antimicrobial activity against some of the bacteria, but the PFOEs were indifferent to both bacteria. In addition, dynamic light scattering (DLS) and transmission electron microscopy (TEM) methods were used to get information about the structural properties of the DDEs and PFOEs in aqueous solution in the absence and presence of NaCl, Figure 1. The change of the hydrodynamic radius ($R_h$) of aggregates was checked with increased surfactant and NaCl concentrations. The $R_h$ values increased with NaCl, but decreased with surfactant concentration. It was also seen that the obtained $R_h$ values for DDEs were lower than those of PFOEs, Figure 2. Furthermore, as determined by TEM method, the structures of these aggregates were found to be spherical in shape.