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Interfacial Behavior of Polymer Coated Nanoparticle LUQING QI, HADI SHAMSIJAZEYI, JASON MANN, RAFAEL VERDUZCO, GEORGE HIRASAKI, Rice Univ, RICE UNIVERSITY TEAM — Oxidized carbon black (OCB) nanoparticle is functionalized with different coatings, i.e. alkyl group, polyvinyl alcohol (PVA) and partially sulfonated polyvinyl alcohol (sPVA). In oil and water systems, the functionalized nanoparticle is found to have a versatile dispersion i.e. in lower aqueous phase, in upper oil phase, or in middle phase microemulsion. Oil substitute n-octane and commercial oil IOSPAR have been test as oil phase; series of commercially available surfactant, C12-4,5 orthoxylene sulfonate(OXS), i-C13-(PO)7 –SO4Na (S13B), surfactant blend of anionic Alfoterra with nonionic Tergitol have been test as additive to help with the OCB dispersion. It is found that the OCB with sulfonated polyvinyl alcohol attachment (sPVA-OCB) stays in microemulsion; with the increase of salinity, it follows the microemulsion to go from lower phase, to middle phase, and to upper phase. The dispersion of sPVA and alkyl functionalized OCB (Cn-OCB-sPVA) is the balance of the length of alkyl and sPVA and the degree of sulfonation of PVA, depending on which, it can either disperse into microemulsion or form a separate layer. The sPVA-OCB also indicates a tolerance of high salinity; this is shown by the stable dispersion of it in blend surfactant solution of anionic Alfoterra and nonionic Tergitol at high salinity API brine(8% NaCl and 2% CaCl2). The study of different functionality on OCB dispersion can help design appropriate modified nanoparticle as additive for enhanced oil recovery either to reduce the interfacial tension between oil and water, or to stabilize microemulsion.

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