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Janus nanoparticles for stable microemulsions with ultra-low IFT values ILSE NAVA, AGUSTIN DIAZ, YI-HSIEN YU, ZHENGDONG CHENG, Texas A&M University — Janus particles are an influential type of materials used in foams, detergents, surfactants and cosmetics. Due to their demonstrated flexibility and non-toxicity, they have the potential to replace molecular surfactants, and thanks to their amphiphilicity, they can stabilize immiscible biphasic systems. Disk-based Janus particles best perform this stabilization. Graphene has been used to manufacture this class of particles; however, their fabrication in high yield by short and atomically economic syntheses remains a challenge. In this project we report the first synthesis of monolayer disks by a one pot reaction under microwave energy. Using a scalable method, these disks were synthesized, emulsified (in an oil/water system), and chemically reacted to obtain the Janus nanodisks with an efficient method. Our nanosheets production technique is a promising approach for the fabrication of Janus nanodisks via emulsification as it produces IFT (interfacial tension) values in a lower range than that of the molecular surfactants. These ultra-low values, in conjunction with the sheets' salt resistance, temperature resistance, and non-toxicity position Janus particles as the next generation of nanosurfactants.

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