Supplementary Material (ESI) for Nanoscale


# Ultrasound Driven Design of Metal Surface Nanofoams

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To evaluate the speed of alloy modification the samples of magnesium, aluminum and iron plates were irradiated different time under intensity 57W/cm$^2$ (Fig. S1, Fig. 3a, Fig. 5b,d). It is well seen that the modification of magnesium is the fastest since the lowest melting point and highest oxidation ability of it. It was found that the optimal time which alloys to form the most developed surface in the case of magnesium was 15 min, after that we begin to observe the decrease of surface roughness. The modification of aluminum begins to be observed in 5 min (Fig. 5d), but the optimal time of sonochemical modification was found to be 30-40 min (Fig. 3a). For steel the optimal time of modification exceeds 120 min (Fig. 3a).

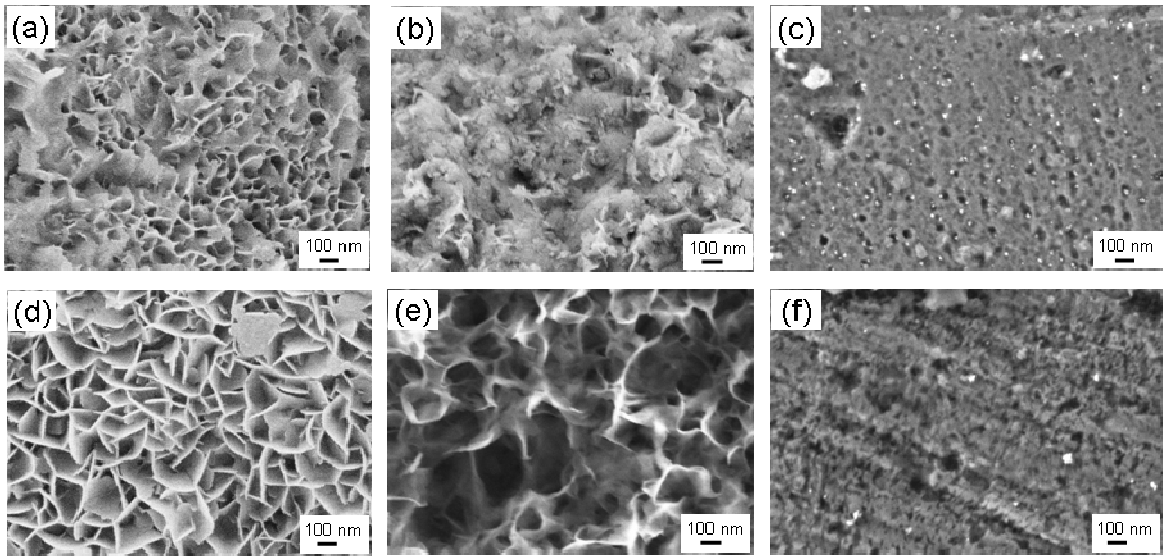


**Fig. S1 SEM images of magnesium (a,d), aluminum (b,e) and iron (c) after 3 (a-c) and 20 min (d-f) of sonication at 57 W/cm$^2$.**

Fig. S2 shows the SEM images of the surface of the different aluminum alloys. The used aluminum plates differ in the composition and properties. AA2024 is a Cu-enriched alloy is characterized by high strength and low corrosion resistance. In the contrast, aa6066 is alloyed with magnesium and silicon and are easy to machine, and can be precipitation-hardened, but not to the high strengths as aa2024. However, all types of the used aluminums exhibit quite similar behavior in ultrasound field.

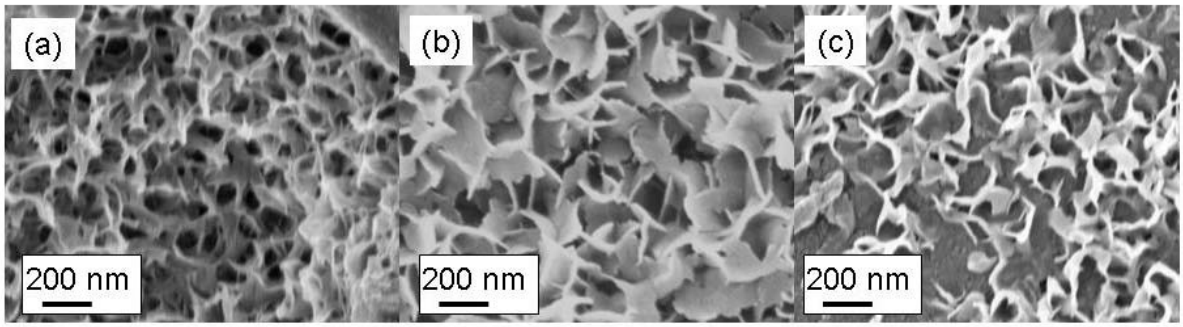


**Fig. S2 SEM images of aluminum (Al%≈ 99,5) (a), aluminum-copper alloy aa2024 (Cu=4.4%, Mn=0.60%, Mg=1.5%, Al balance) (b) and aluminum-magnesium-silicon alloy aa6066 (Si=1.4%, Cu=1.0%, Mn=0.8%, Mg=1.1%, Al balance) (c) after 40 min sonication at 57 W/cm$^2$.**