



Figure S1. Illustrative images of the MAR-FISH results obtained in this work. FISH-positive cells are depicted as white cells in images A, B, C, and red cells in images D and E. The MAR signal corresponds to the black dots (silver grains) in all images except for E.

- A) FISH-positive *Azoarcus* cells with no butyrate uptake (-), with silver grains as background level (blue circle).
- B) FISH-positive *Thauera* cells with moderate uptake of valerate ((+)), i.e. some cells with silver grains (yellow circle), some without (blue circle).
- C) FISH-positive *Alphaproteobacteria* (*Paracoccus*) cells incubated with multiple substrates, most with uptake of acetate (+) (yellow circles).
- D) FISH-positive *Alphaproteobacteria* (*Paracoccus*) cells with high uptake of butyrate (++) (yellow circles).
- E) and F) FISH-positive *Thauera* cells with no uptake of acetate (-), as shown by the absence of MAR signal in F (blue circle).