

Supplementary Information

S1. Details on mussel samples preparation

Details of how the mussel samples were cultured in the laboratory have been described. Fig. S1a shows the water tank used to farm the marine mussels in the lab, which includes a glass water tank, a chiller, a water filter system, two water pumps and one airline with tubing. The PH value of artificial seawater is 8.5, as shown in Fig. S1b. After the mussels were picked up from the Hunstanton mussel farm, they were placed on acrylic substrates, one substrate per mussel, and then secured with rubber rings to prevent them from moving (Fig. S1c). After the generated byssus systems have adhered to the substrates, carefully cut them off from the mussels' bodies for the following mechanical tests and SEM imaging.

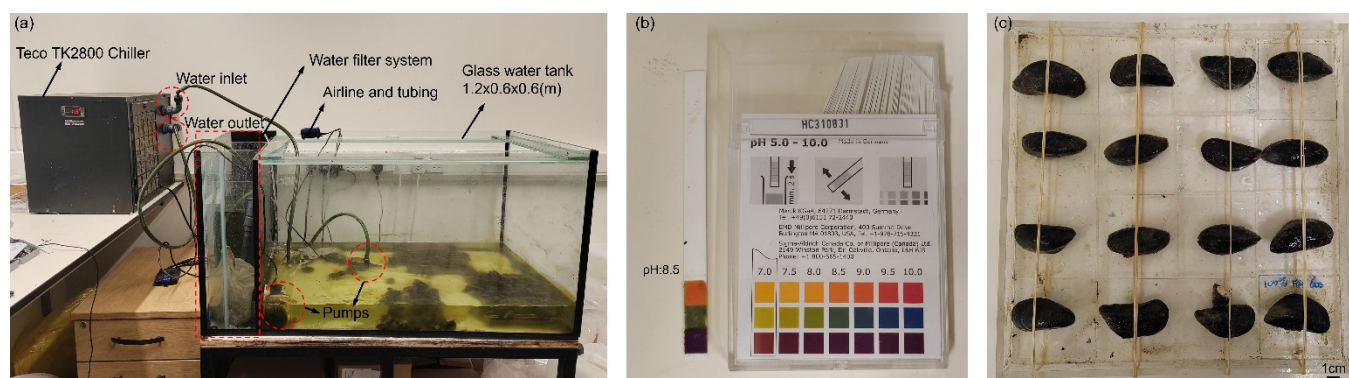


Figure S1. (a) The water tank for mussels, (b) the seawater PH=8.5, (c) rubber bands were used to fix uniformly sized marine mussels to the substrate.