Electronic Supplementary Material (ESI) for Polymer Chemistry.

SUPPLEMENTARY INFORMATION

Incorporation of alkyl-halide initiator moiety into the frustule of *T. weissflogii*. Synchronized *T. weissflogii* cultures were inoculated in artificial seawater media enriched with F/2 Guillards media at either 1 x 10^4 cells/mL or 1 x 10^5 cells/mL in a final volume of 200 ml. Cultures received TEOS and CTEOS at a ratio of 3 TEOS:1 CTEOS such that the silicic acid concentration in culture was 200 μM at each addition. Cultures received TEOS/CTEOS precursors at time of inoculation and at 48 hour intervals until time of collection at 192 hours post inoculation. Control cultures received Na_2SiO_3 at a final concentration of 200 μM at each dosing time-point. Cell density was determined using a haemocytometer. Six flasks were inoculated for each treatment. Cultures were harvested by centrifugation 192 hours post inoculation. The organic casing of the diatom was removed by successive washes with de-ionized water and methanol. Diatoms were washed three times in de-ionized water, followed by three washes in de-ionized water heated to 60^0C. The final cleaning step involved a minimum of three washes in methanol until the pellet appeared white in color.

Characterization of TEOS/CTEOS *T. weissflogii* by energy dispersive X-ray spectroscopy coupled to scanning electron microscopy (EDX-SEM) and transmission electron microscopy (TEM). EDX-SEM analysis was performed using Hitachi S-4700 SEM with INCA® software. Cleaned diatoms suspended in methanol were allowed to air dry on a carbon stub and were subsequently gold coated. Diatoms were analyzed if the valve view was clearly visible. TEM images of frustules were collected using Hitachi H-7500 TEM with AMT image capture software. Cleaned diatoms suspended in methanol were allowed to air dry on a copper grid. Pore parameters (perimeter, width, length and area) were quantified using ImageJ software. The resolution of images analyzed was 0.5 nm/pixel. The mean pore parameters were calculated as follows; five sections per diatom were analyzed to calculate the mean pore parameters per diatom, three separate diatoms were analyzed to calculate the mean pore parameters per culture, three separate cultures were analyzed to calculate the mean pore parameters for both *T. weissflogii* and TEOS/CTEOS *T. weissflogii*.

Statistical analysis. GraphPad Prism® software was used to perform statistical analysis. Details of statistical analysis performed are detailed in sections above. A two-way ANOVA followed by Bonferroni *post-hoc* analysis

was performed to determine statistical differences between treatment groups at $p<0.05$. One-way ANOVA was performed to investigate determine statistical differences between treatment groups at $p<0.05$.

Investigating the effect of ethanol on the growth profile of T. weissflogii

Methods: Synchronised *T. weissflogii* cultures were inoculated at 1 x 10^5 cells/mL in a final volume of 200 ml. Cultures received either Na_2SiO_3 or Na_2SiO_3 and ethanol at time of inoculation and at 48 hour intervals until time of collection. Na_2SiO_3 was added at a final concentration of 200 µM. Ethanol was added at a final concentration of 750 µM. Six flasks were inoculated for each treatment. A two-way ANOVA followed by Bonferroni *post-hoc* analysis was performed to determine statistical differences between treatment groups at $p<0.05$.

Results: As the hydrolysis of alkoxysilanes and organoalkoxysilanes releases alcohol, the potential toxicity of ethanol to *T. weissflogii* growth was investigated. Addition of TEOS/CTEOS mix to the culture media at a final silicic acid concentration of 200 µM has the potential to generate a concentration of 750 µM ethanol. Thus, the effect of addition of ethanol at a concentration of 750 µM at 48 hour intervals on the growth profile of *T. weissflogii* was investigated. The presence of 750 µM ethanol in the culture media did not adversely affect the growth profile of *T. weissflogii* (Supplementary Figure 1).

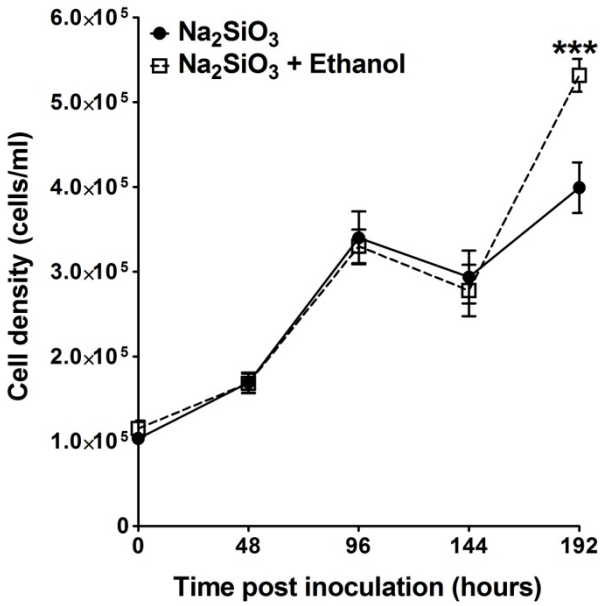

Fig. S1 - The growth profile of *T. weissflogii* grown in the presence of Na_2SiO_3 or Na_2SiO_3 + ethanol added at 48 hour intervals. Two-way ANOVA followed by Bonferroni *post-hoc* analysis revealed statistical difference. Data are shown as mean ± sem (n = 6) ***$p<0.001$.