Supplementary information

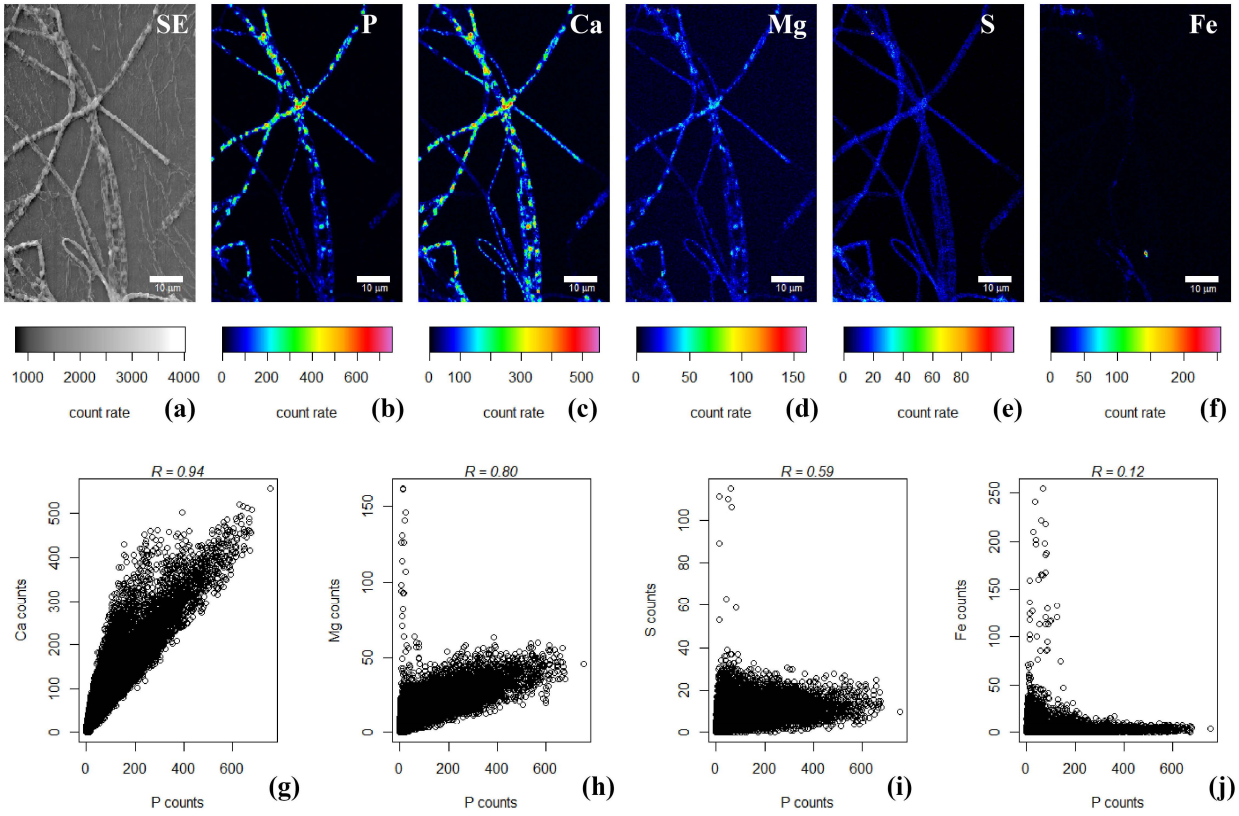
Table S1. Overview of the samples used in the different figures. Samples were collected from incubated sediments from Rattekaai Salt Marsh (RSM), Marine Lake Grevelingen (MLG), and Mokbaai (MB) in the Netherlands, or the Black Sea (BS). Coating was either with carbon (C) or gold (Au), depending on the instrument used for imaging and elemental analysis. Phenom: Phenom ProX desktop scanning electron microscope, JEOL: JXA-8530F Hyperprobe Field Emission Electron probe micro-analyzer, Zeiss: Zeiss Axiovert 200M epifluorescence microscope.

Figure	Site	Coating	Accelerating Voltage	Instrument	Filament extr
2a	RSM	C	15 kV	JEOL	FEP 1
2b	MB	Au	10 kV	Phenom	FEP 1
2c	MB	Au	10 kV	Phenom	FEP 3
3a	RSM	-	-	Zeiss	FEP 1
3bc	RSM	Si wafer	10 kV	Phenom	FEP 1
3d + 4	RSM	C	15 kV	JEOL	FEP 1
5a	MB	Au	10 kV	Phenom	FEP 1
5b	MB	Au	10 kV	Phenom	FEP 4
6	RSM	C	15 kV	JEOL	FEP 1
7	MLG	-	-	oLine D^3HM	-
8a	MB	Au	10 kV	Phenom	FEP 3
8b	RSM	Au	10 kV	Phenom	FEP 4
8c	RSM	Au	10 kV	Phenom	FEP 1
8d	MB	Au	10 kV	Phenom	FEP 1
8e	BS	Au	10 kV	Phenom	FEP 2
8f	RSM	Au	10 kV	Phenom	FEP 1
8g	BS	Au	10 kV	Phenom	FEP 2
9a	BS	Au	10 kV	Phenom	FEP 2
9d	MB	Au	10 kV	Phenom	FEP 3

9bcef	MLG	-	-	Zeiss Auriga Crossbeam system	-
10+11	RSM	C	15 kV	JEOL	FEP 1

Supplementary information

Fig. S1 Secondary electron image showing cable bacteria and the corresponding X-ray element maps of (**a**) secondary electrons (**b**) phosphorus, (**c**) calcium, (**d**) magnesium, (**e**) sulfur and (**f**) iron. To assess the correlation between the elements, scatter plots of (**g**) P and Ca, (**h**) P and Mg, (**i**) P and S, (**j**) P and Fe are shown. All scatterplots were produced from a pixel-by-pixel analysis from the wavelength-dispersive X-ray element maps collected with the electron probe micro analyzer. The Pearson's correlation coefficient (R) values are depicted on top of the scatterplots.



Supplementary information

Video 1: FIB-SEM video composed of 525 electron backscatter images showing the horizontal cross-sectional view along the length of three cells of a weakly encrusted filament. After each image a section of 10 nm was removed with the ion beam before a new section was imaged. The mineral encrustation can be seen as a dark seal around the filament while the ridge compartments and the cell content are unstained and appear white, the shared periplasmic space is gray. The encrustation is only found around the filament and not within the periplasmic space. At time stamp 0:21 and 1:13 the cell-cell junctions can be observed. On average, ˜180 nm of encrustation surrounds the cable bacterium.

Video 2: FIB-SEM video composed of 501 electron backscatter images. After each image a section of 10 nm was removed and a new section was imaged. The video shows two filaments with a horizontal cross-sectional view along the length of the filament that can be seen on the right at the start of the video. The filament that is visible on the left at the start of the video follows a different direction and therefore the cross-section shows different angles. The thick layer of mineral encrustation appears as a dark seal around the filament, the ridge compartments and the cell content appear white. The encrustation is only found around the filament and not within the periplasmic space. Both filaments are strongly encrusted and the mineral crust of both filaments is partly cemented together which can be observed from 0:06 till 0:26. The encrustation is heterogeneous with an average thickness of ˜500 nm.