Supplementary information

Depth profile

The composition was investigated throughout the coating in point 5 of batch 1 (deposited on an Si wafer) by sputtering and XPS measurements. The parameters used were an X-ray power of 100 W and a spot size of 100 µm. Sputtering was conducted every 60 s for 10 min with Ar^+ ions at 500 V and every 2 min with Ar^+ ions at 2 kV for 100 min. The results show a surface oxide that is sputtered away after about 180 s followed by a steady composition until approximately 6000 s when the signal starts to originate from the substrate.

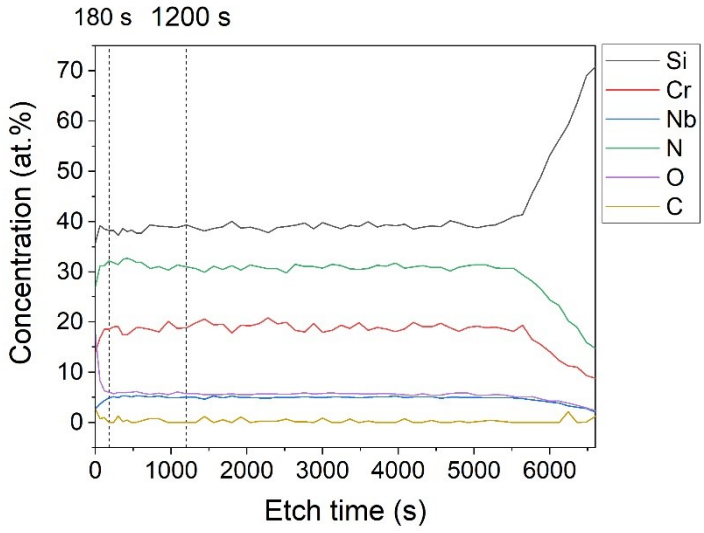

Figure S1. Depth profile of point 5 SiCrNbN deposited on Si wafer. The dashed lines indicate the sputtering time (180 s and 1200 s) for batch 1 and batch 2 respectively.

Dissolution

Since the ion release correlated primarily to the Cr content, the ion concentration was reported as a function of Cr content in the main manuscript. However, a visualization of the ion release as a function of Point number was necessary to report for full disclosure as well as for the discussion, and can be found in Figure. S2.

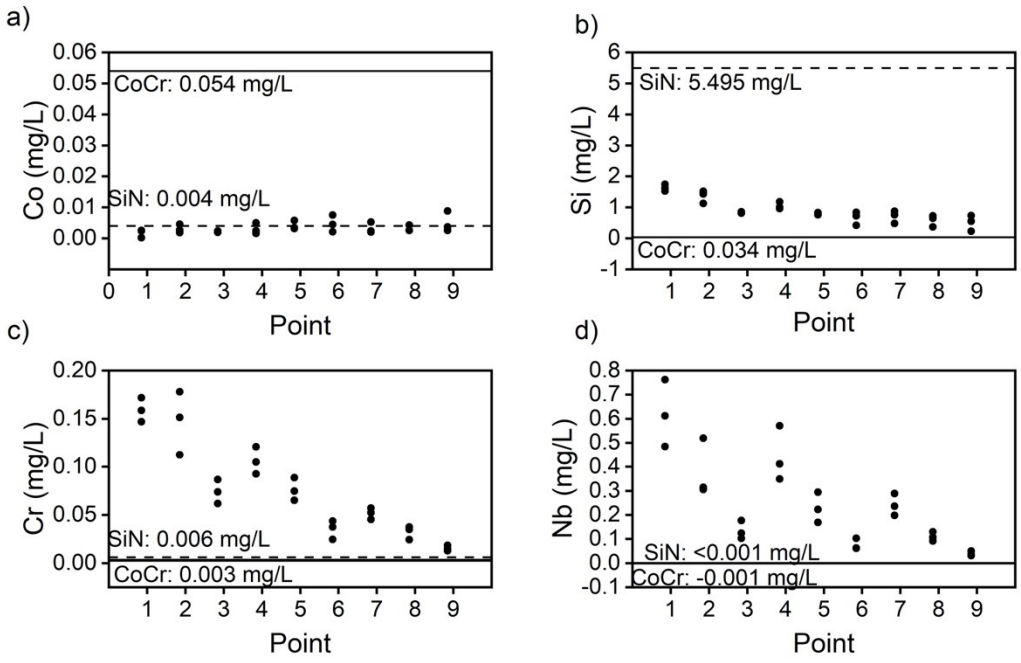

Figure S2. Ion concentration from the 9 points on the samples surface. a) Co ions; b) Si ions; c) Cr ions; d) Nb ions. The corresponding release from CoCr and SiN references is indicated as lines in each graph.

In vitro cell response

A preliminary cytotoxicity study was performed using the extracts diluted to different extents (1:1, 1:2, 1:4, 1:8, 1:10, 1:12, 1:16 and 1:32 dilution) with the aim of finding the appropriate dilution for the assessment of potential differences between compositional points on the coating surface. The cell viability (Figure S3) showed an increase in viability with higher dilution for all coated samples, reaching values higher than 70% from 12 times dilution on day 1. The cell viability remained higher than 70% for the 3 days for both the coated samples and the control CoCr only after 16 times dilution. The results showed all extracts to be cytocompatible at 16 and 32 times dilutions.

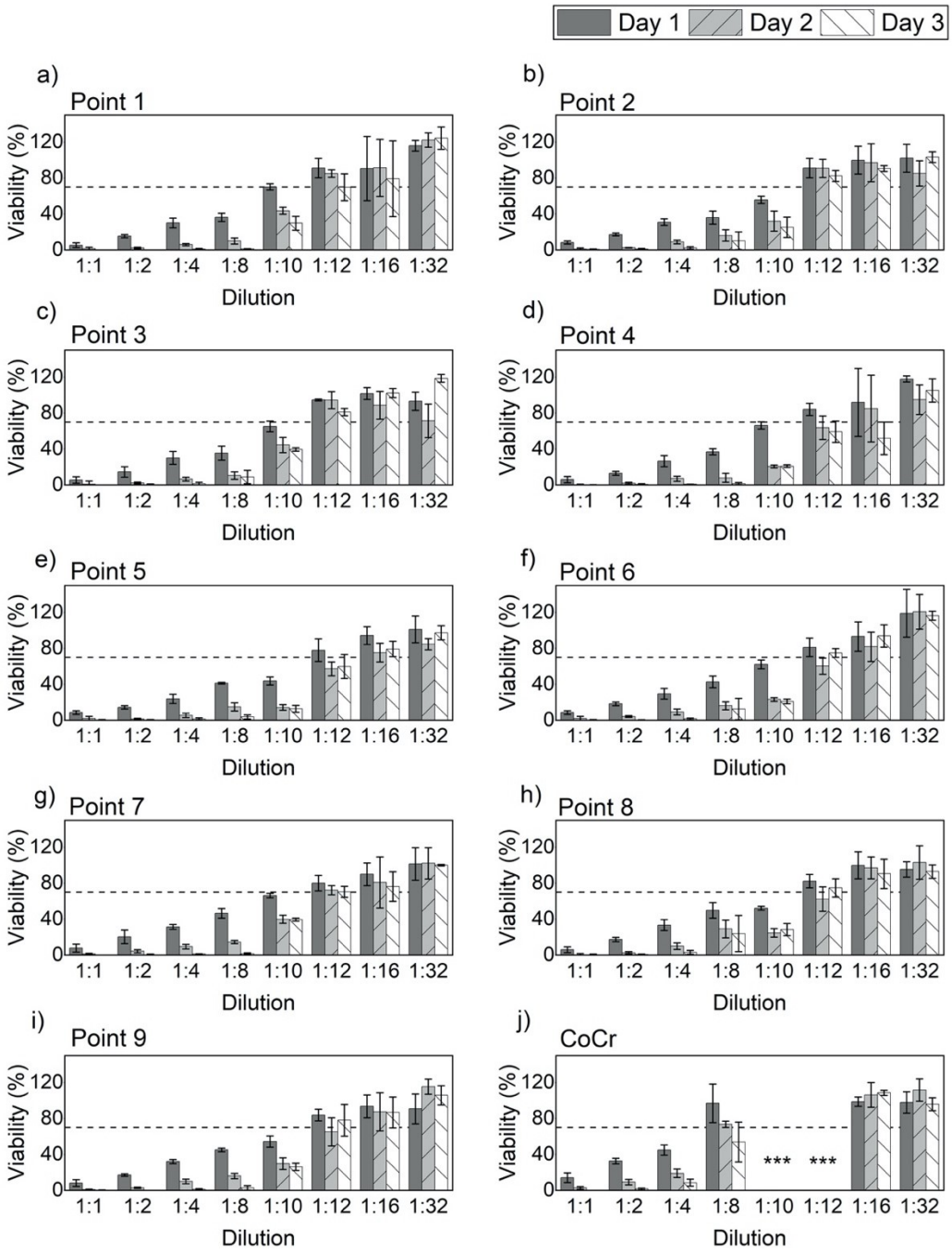

Figure S3. Cell viability of L929 cells in the presence of different dilutions (1:1, 1:2, 1:4, 1:8, 1:10, 1:12, 1:16 and 1:32) of extracts over 3 days from the 9 sample points (a)-i)) and CoCr control (j)). * Data not available**

Therefore, dilution 1:16 was chosen for the next studies, also dilutions 1:1, 1:8 and 1:12 were used for verifying if the cells tolerated the extracts in a dose dependent manner. The results (Figure S4) show an increase of viability at higher dilutiona and differences between samples could be seen at 16 times dilution as expected. However, some of the points (1, 4, 6, 7 and 9) showed an increase of viability until 12 times dilution followed by a decrease in dilution 16, meaning that a higher ion concentration leads to a higher viability in some of the coatings tested. This supports the indication that there is a certain positive effect of the ions in the coating on the cell viability as discussed in the main manuscript.

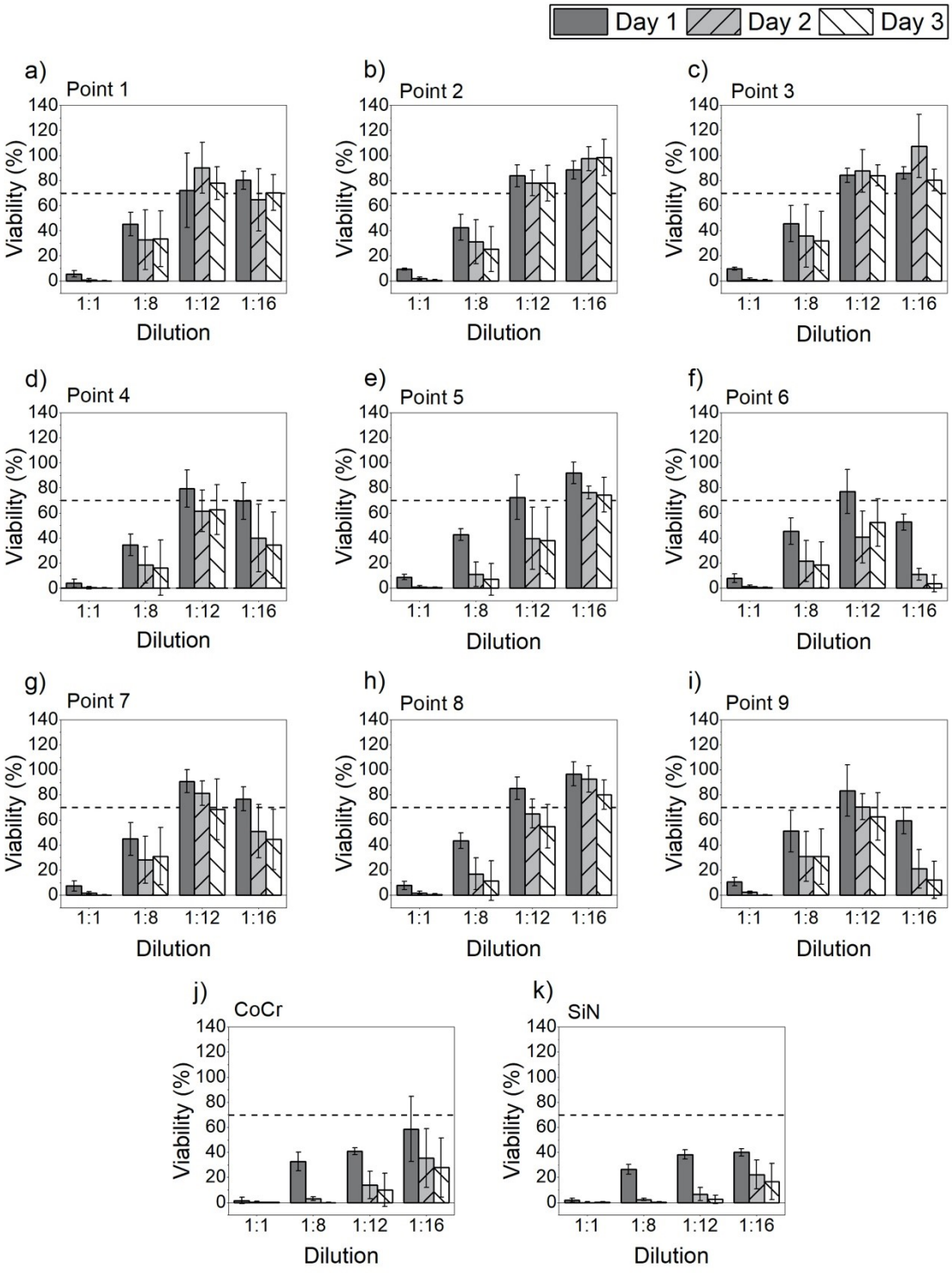

Figure S4. Cell viability of L929 cells in the presence of different dilutions (1:1, 1:8, 1:12 and 1:16) of extracts over 3 days from the 9 sample points (a)-i)) SiN and CoCr control (j)).