Electronic Supplementary Information

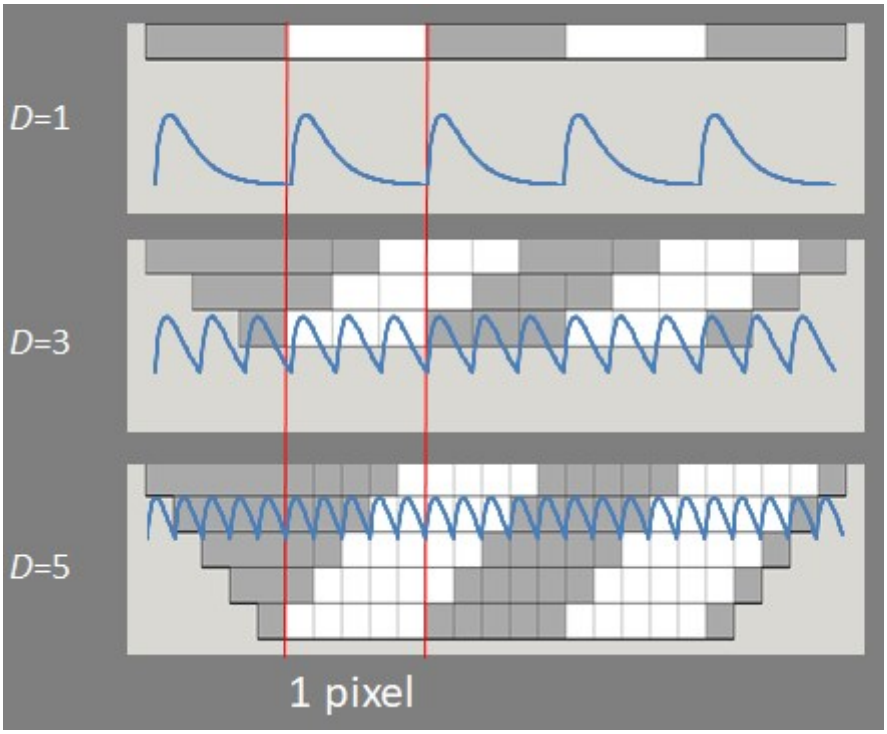
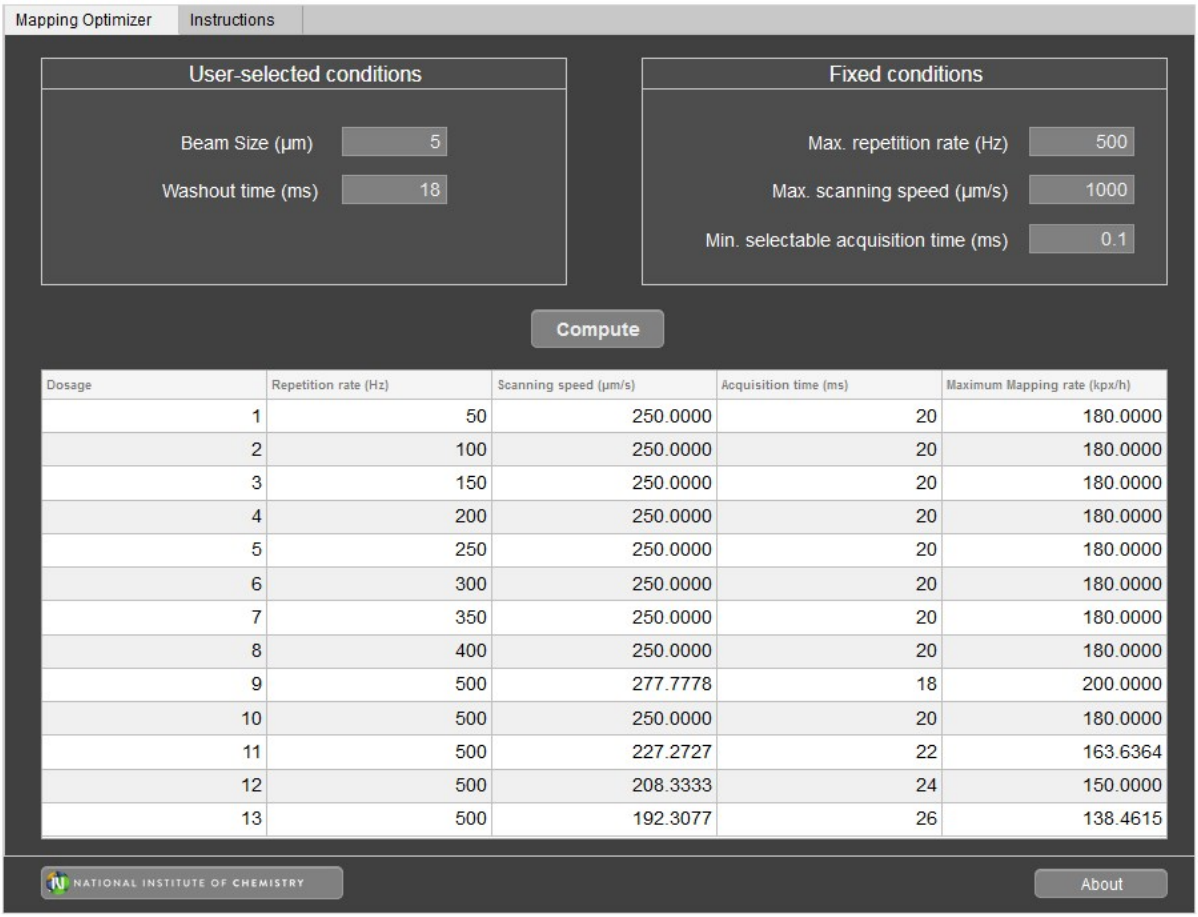


Fig S1 A concise explanation of the fundamentals of LA-ICP-QMS mapping. Cross-sections of three identical samples are shown, containing a homogeneously distributed element of interest, which are ablated with a beam size *BS* and dosages *D* of 1, 3 and 5, respectively. This implies that *D* laser shots are fired per pixel (indicated by the distance between the red lines for a single pixel); however, only the area sampled at *D* = 1 can be attributed to the a true pixel size of *BS*×*BS*, whereas at *D* = 3 and 5 the area sampled is associated with a pixel size of 1⅔*BS*×*BS* and 1⅘*BS*×*BS*, respectively (or 2*BS*-*BS*/*D*)×*BS* in generic form). Also the volume (sampled step-wise) per pixel differs as can be seen from the alternating white and grey blocks (lateral and depth dimensions not to scale). Nevertheless, we assume that for all dosages the pixels are associated with sampling of an area *BS*×*BS*. Each pixel, containing the (compounded) laser pulse profiles with washout profile *FW*0.01*M* (indicated by the blue lines), is recorded in the acquisition time window *AT*.



Dosage	Repetition rate (Hz)	Scanning speed (µm/s)	Acquisition time (ms)	Maximum Mapping rate (kpx/h)
1	50	250.0000	20	180.0000
2	100	250.0000	20	180.0000
3	150	250.0000	20	180.0000
4	200	250.0000	20	180.0000
5	250	250.0000	20	180.0000
6	300	250.0000	20	180.0000
7	350	250.0000	20	180.0000
8	400	250.0000	20	180.0000
9	500	277.7778	18	200.0000
10	500	250.0000	20	180.0000
11	500	227.2727	22	163.6364
12	500	208.3333	24	150.0000
13	500	192.3077	26	138.4615

Fig S2 Screenshot of the online app for optimization of the LA-ICP-QMS settings (https://laicpms-apps.ki.si/webapps/home/session.html?app=MappingOptimizerApp).