Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supplementary information

Estimated depth calculation

- In this work, the in-built ION-TOF depth estimation was used. It estimates a sputter rate using the beam current, raster area, atomic density of the material. We used a simple TRIM calculation to generate the sputter yield for each element.
  - Beam current: 271 nA
  - Raster area: 0.15 x 0.15 cm^2
  - Atomic density: 8.5e22 atoms/cm^3 (calculated from reference [9])
  - TRIM sputter yields per incident Ar+ ion at 60 degrees: La (0.2385), Sr (0.4904), Co (0.1188), Fe (0.4674) and O (2.73). Total sputtered per ion: 4.0451.
- Since we are using Ar^+, the beam current (charge per time) is equal to the number of ions. So:
  - 271 nA / elemental charge (1e-19) = 1.69e12 ions per second
- The raster area is 0.0225 cm^2, so the dose density is:
  - 7.53611e13 ions/cm^2.s
- Which, factoring in the sputter yield:
  - 3.04843e14 ions/cm^2.s
- If the atomic density is 8.5e22 atoms/cm^3:
  - The number of atoms in one 'surface layer' is: $8.5e22^{2/3}$ = 1.9373e15
  - The number of atoms along the 'height' of the volume is $8.5e22^{1/3}$ = 4.40148e7
  - The 'planar spacing' of the material is the height of the volume (here, simply 1cm or 1e-7 nm) divided by the number of atoms along the height:
    - 1e-7 / 4.40148e7 = 0.23 nm
- Therefore, when a surface layer is removed (1.9373e15 atoms), 0.23 nm is removed.
- A sputter rate can therefore be calculated using:
  - (sputtered ions per second / number of atoms per layer) * planar spacing
  - 0.0036 nm/s