The analysis of glass samples with high resolution electron microscopy is challenging, because these techniques are not ideal for imaging amorphous samples. Visualizing the nanoscale elemental distribution and aggregation within glasses can lead to better modeling and understanding of their thermal, electrical, and mechanical properties. Advances in glass technology have lead to “gorilla glass”, the practically indestructible material found in the screens of many mobile devices. Understanding the nanoscale properties of materials like “gorilla glass” can lead to the development of new even stronger materials.

In the local electrode atom probe (3D LEAP) traditionally amorphous glasses have been difficult to run, with a particularly high failure rate. Until now the predominant approach for the preparation of such samples has been FIB liftout from a bulk specimen, which is time consuming and costly. We have developed technique for drawing glass rods or capillaries into sub 100 nm atom probe tips (Fig.1). This rapid and low expense technique means that even though the possible failure rate in the atom probe may be high, a significant amount of time is not wasted with sample preparation.

We found that after coating the glass nanotips with metal we were able to use voltage mode on the atom probe to successfully characterize a glass specimen (Fig. 2) which shows a very well defined Boron concentration surface. Further development of this technique could lead to new understandings of the structure property relationships in glasses and provide new pathways for studying materials doped or encapsulated within glasses.

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Fig. 1: SEM Image of the rapid preparation Glass APT nanotip, showing diameter less than 100nm (Inset) Glass nanotip mounted in the analysis chamber

Fig. 2: APT Reconstruction of Glass nanotip showing an Isosurface of Boron concentration in the glass sample