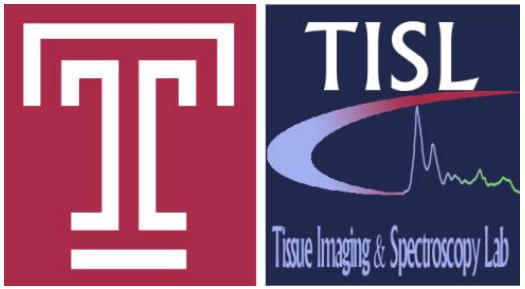
Effects of sterilization on silver halide fiber optic probes

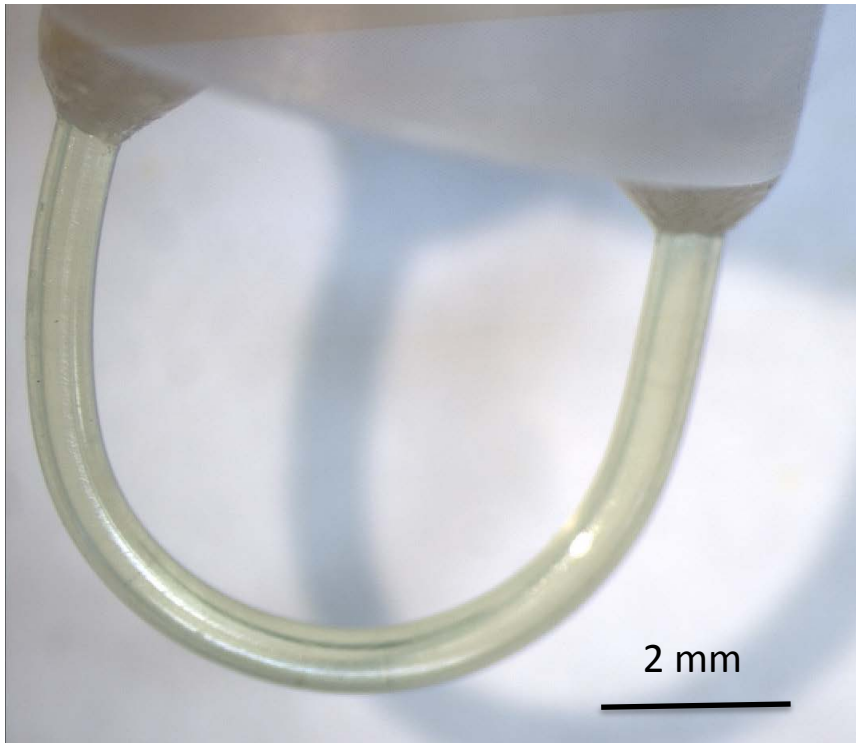


Method

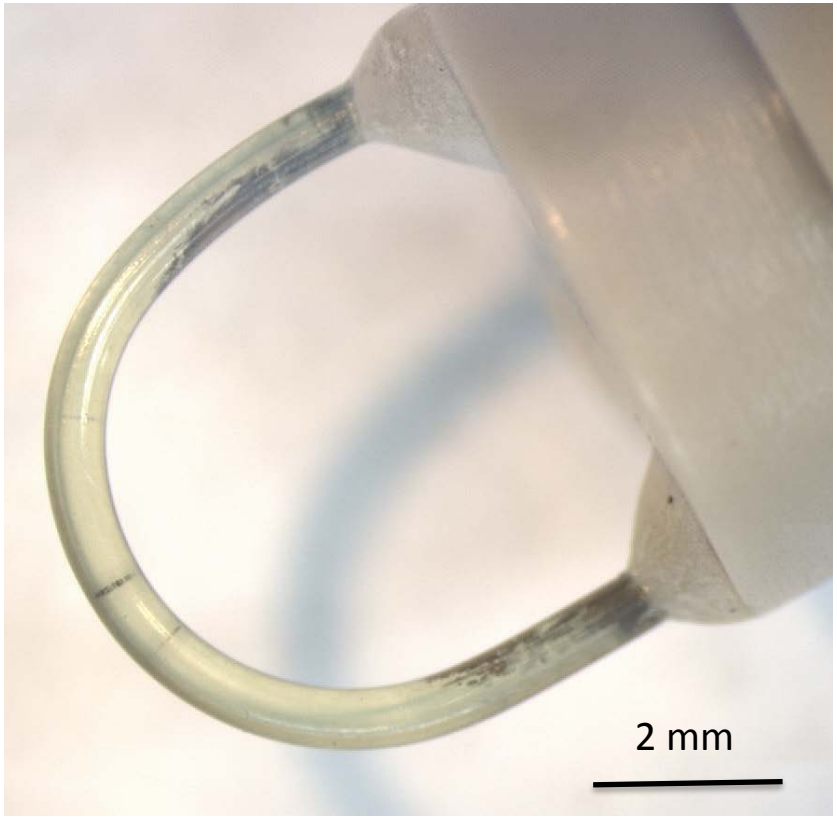
- Fifteen silver halide probe tips were divided equally into the Sterrad®, autoclave and control groups.
- Sterilized the Sterrad® group three times using Sterrad®
  - Hydrogen peroxide gas plasma with an exposure time of 55 minutes
- Sterilized the autoclave group three times using the autoclave
  - Steam sterilization at 270°F for a 4 minute exposure cycle.
- Kept the control group unsterilized
- Collected spectra and images using a Leica dissecting microscope before and after each cycle of sterilization. The samples used to collect spectra were 95% Ethanol, ATR Standard, bovine cartilage and bovine patellar tendon.

Sterrad® Results

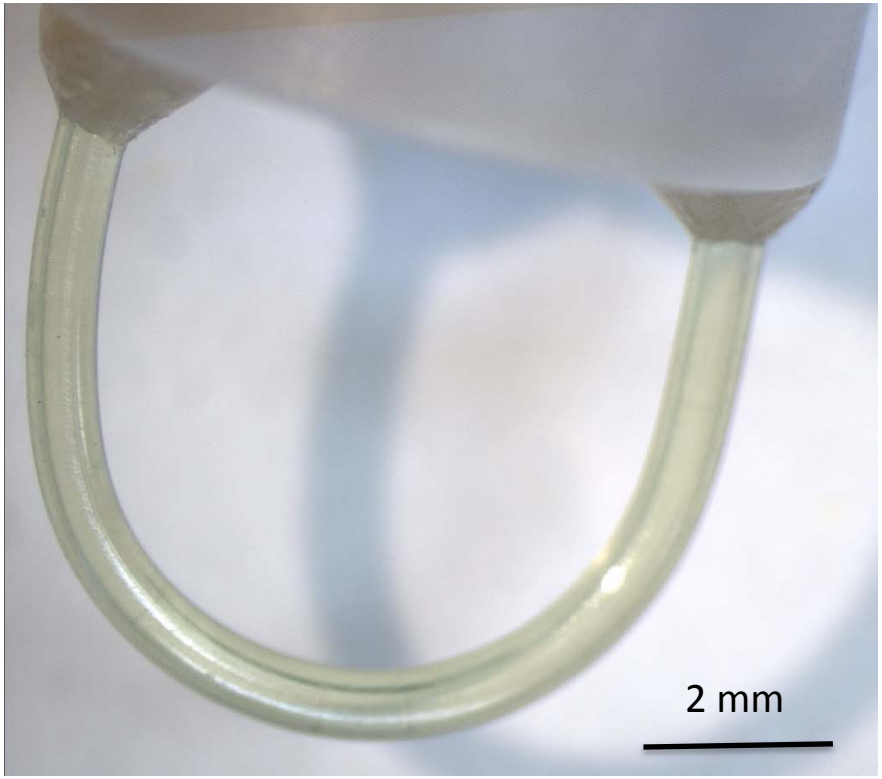
Silver halide probe tip 1 from Sterrad® group before sterilization



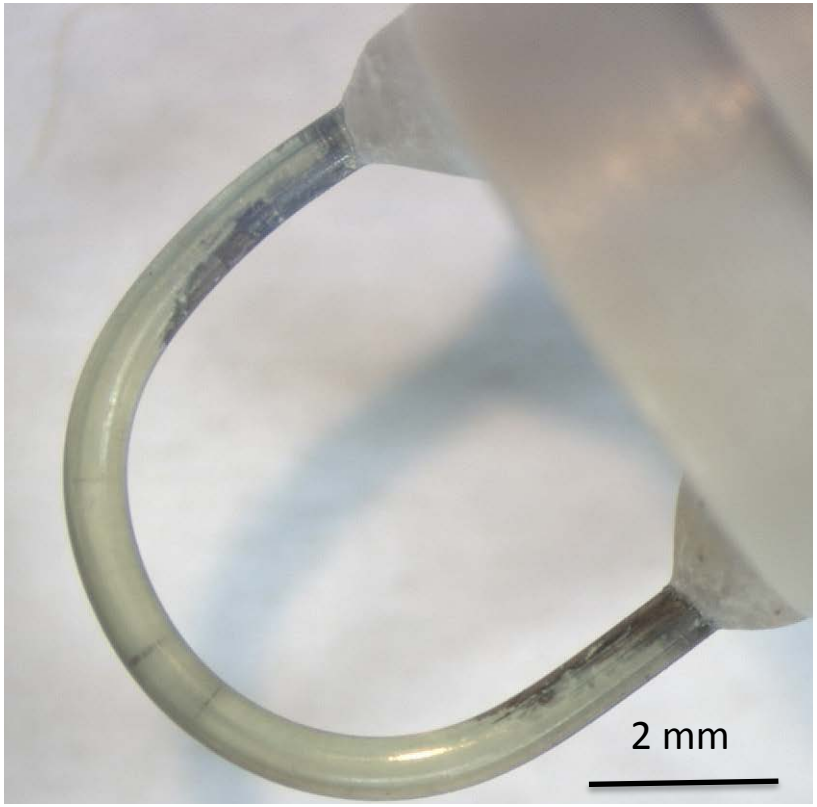
Silver halide probe tip 1 from Sterrad® group after sterilization cycle 1



Silver halide probe tip 1 from Sterrad® group before sterilization



Silver halide probe tip 1 from Sterrad® group after sterilization cycle 3



Summary of results for Sterrad® group

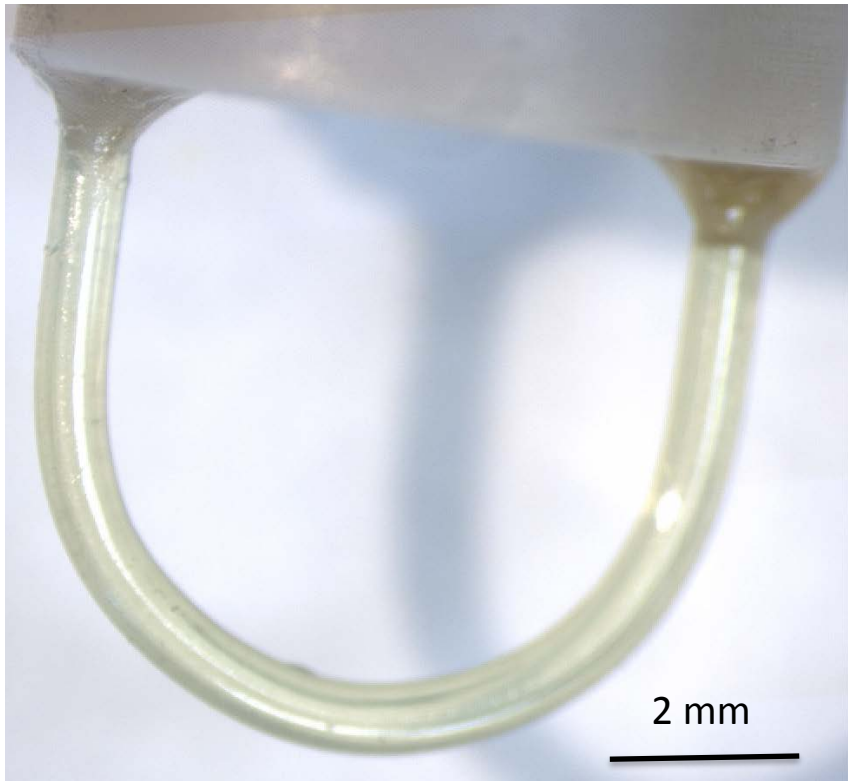
- A probe tip in the Sterrad® group became blackened at the two ends after sterilization cycle 1.

- The blackened effect was not observed in the remainder of the probes in the Sterrad® group.

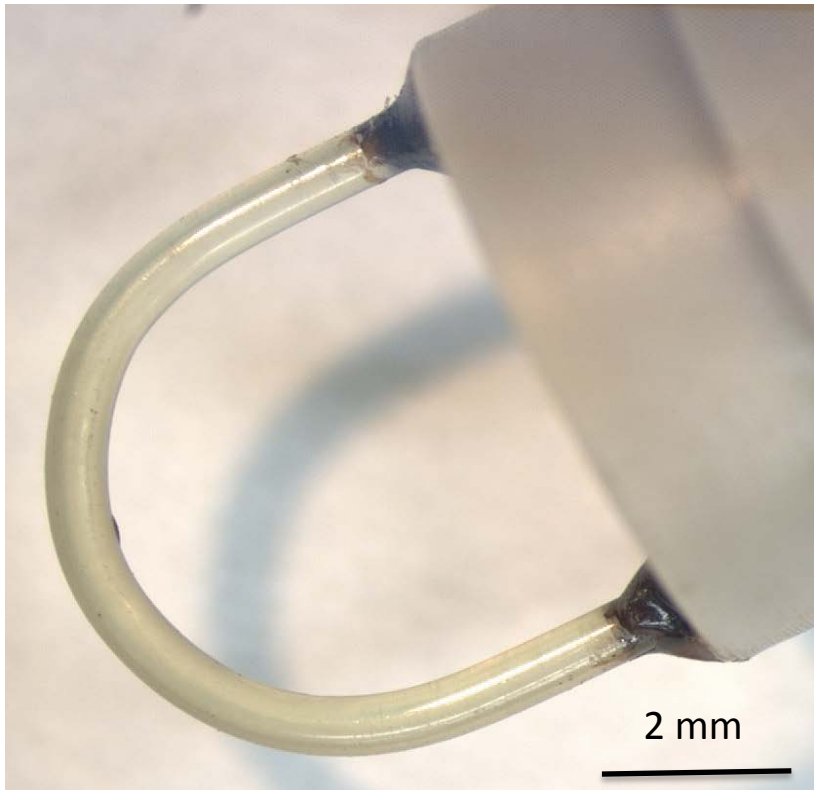
- The epoxy resin, securing the fiber optic to the polymer mount, changed from a tan to a white color for all probes in the Sterrad® group.

Autoclave Results

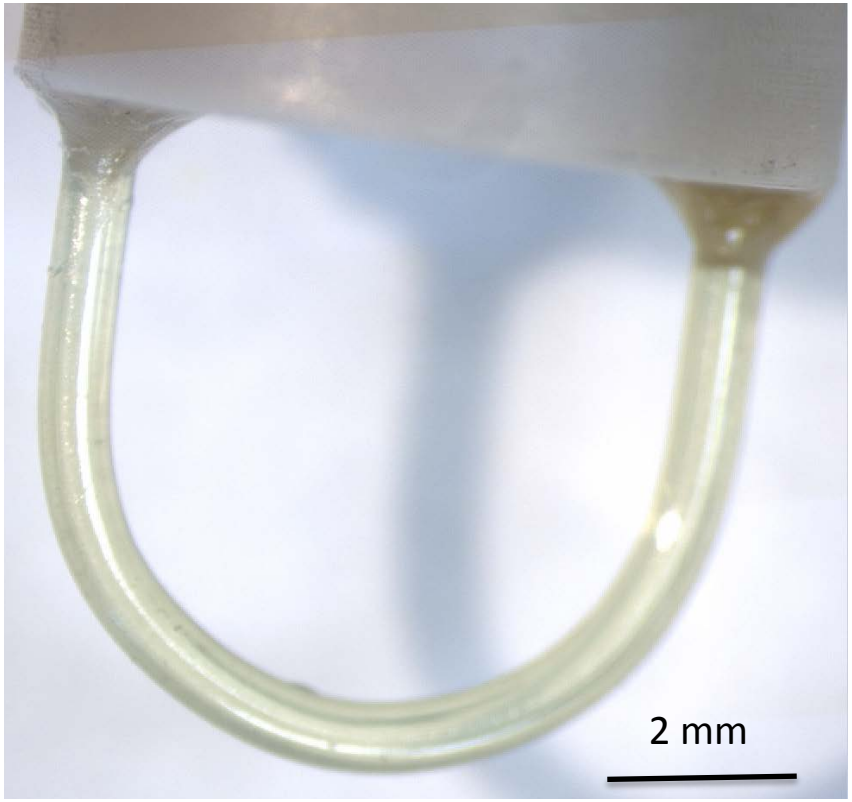
Silver halide probe tip 1 from autoclave group before sterilization



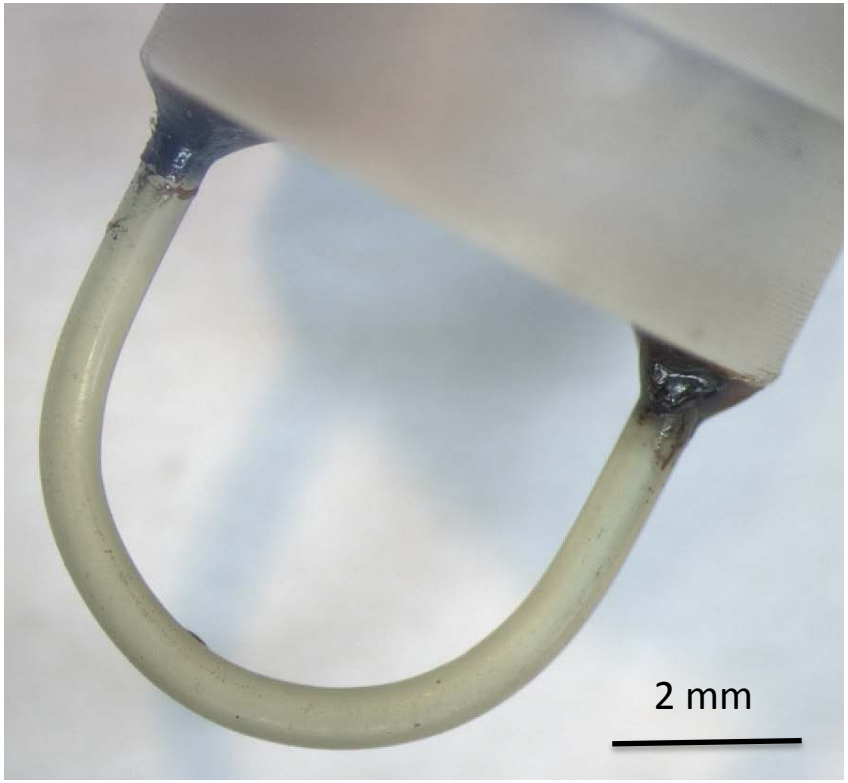
Silver halide probe tip 1 from autoclave group after sterilization cycle 1



Silver halide probe tip 1 from autoclave group before sterilization



Silver halide probe tip 1 from autoclave group after sterilization cycle 3



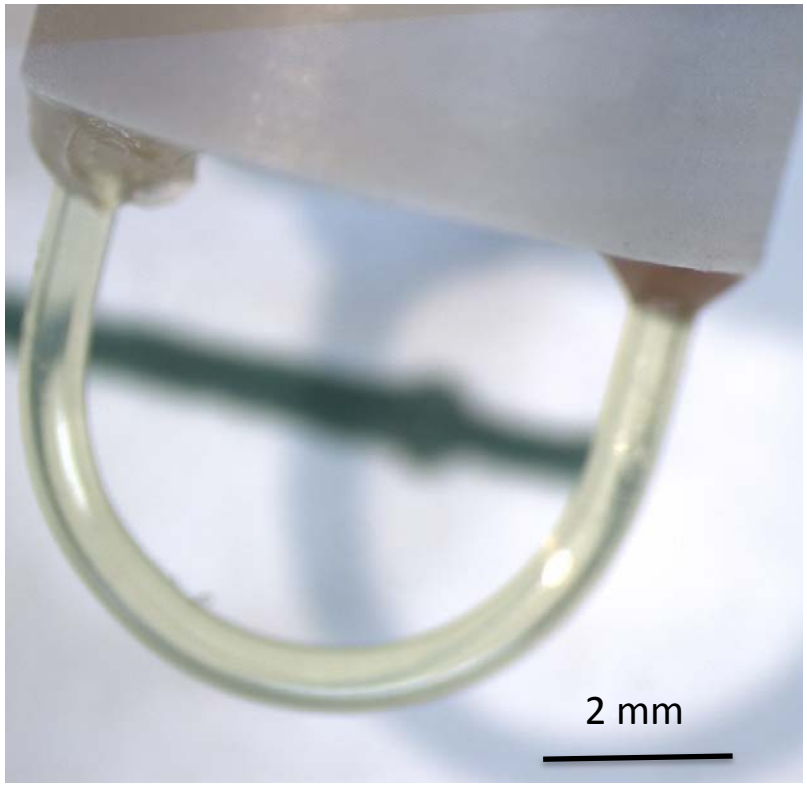
Summary of results for the autoclave group

In the autoclave group all probes appeared cloudy after the first cycle of sterilization and the epoxy resin changed to a dark brown color.

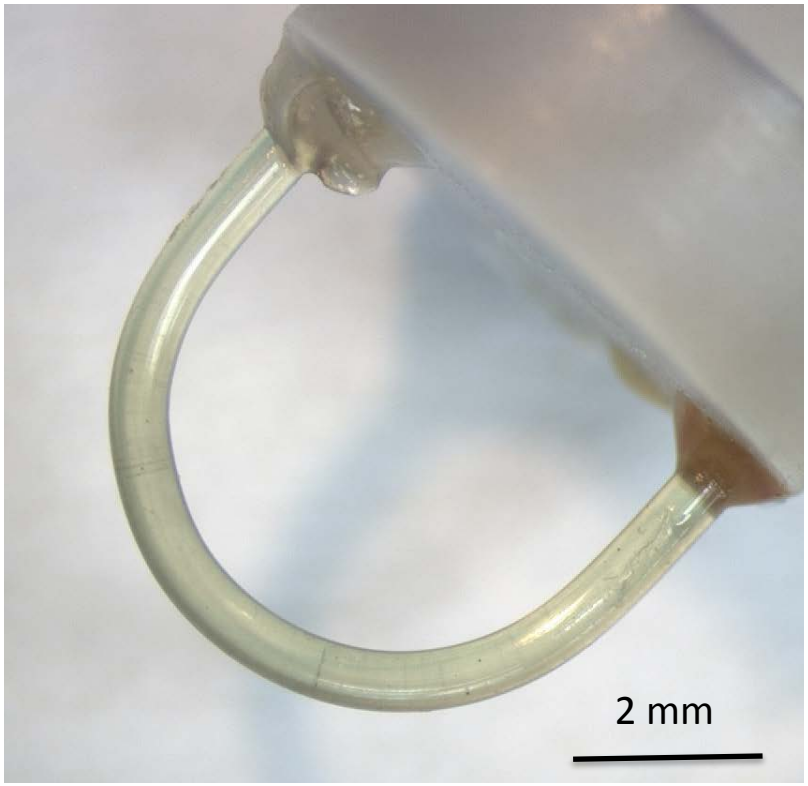
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Control Group Results

Silver halide probe tip 1 from control group before sterilization

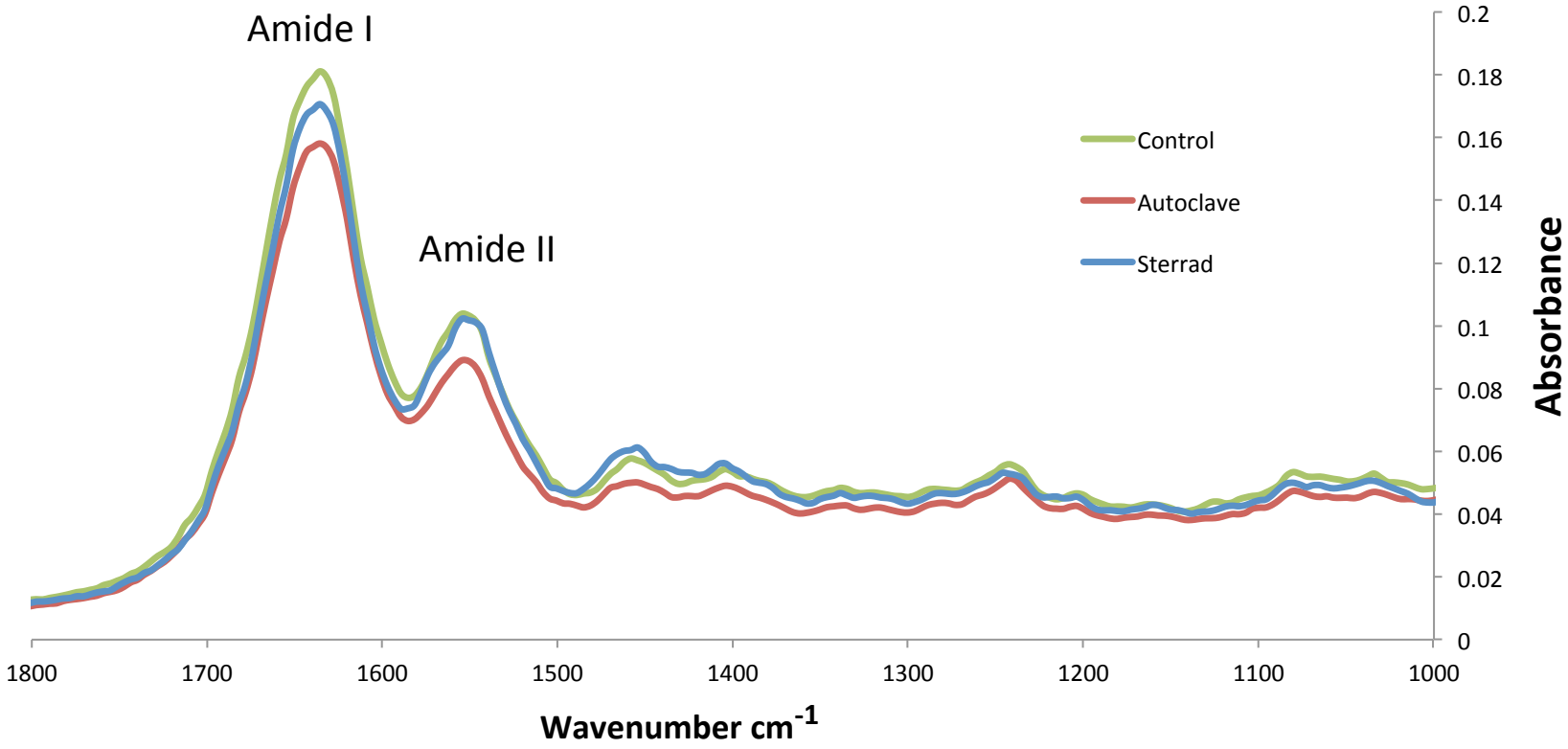


Silver halide probe tip 1 from control group after sterilization cycle 3

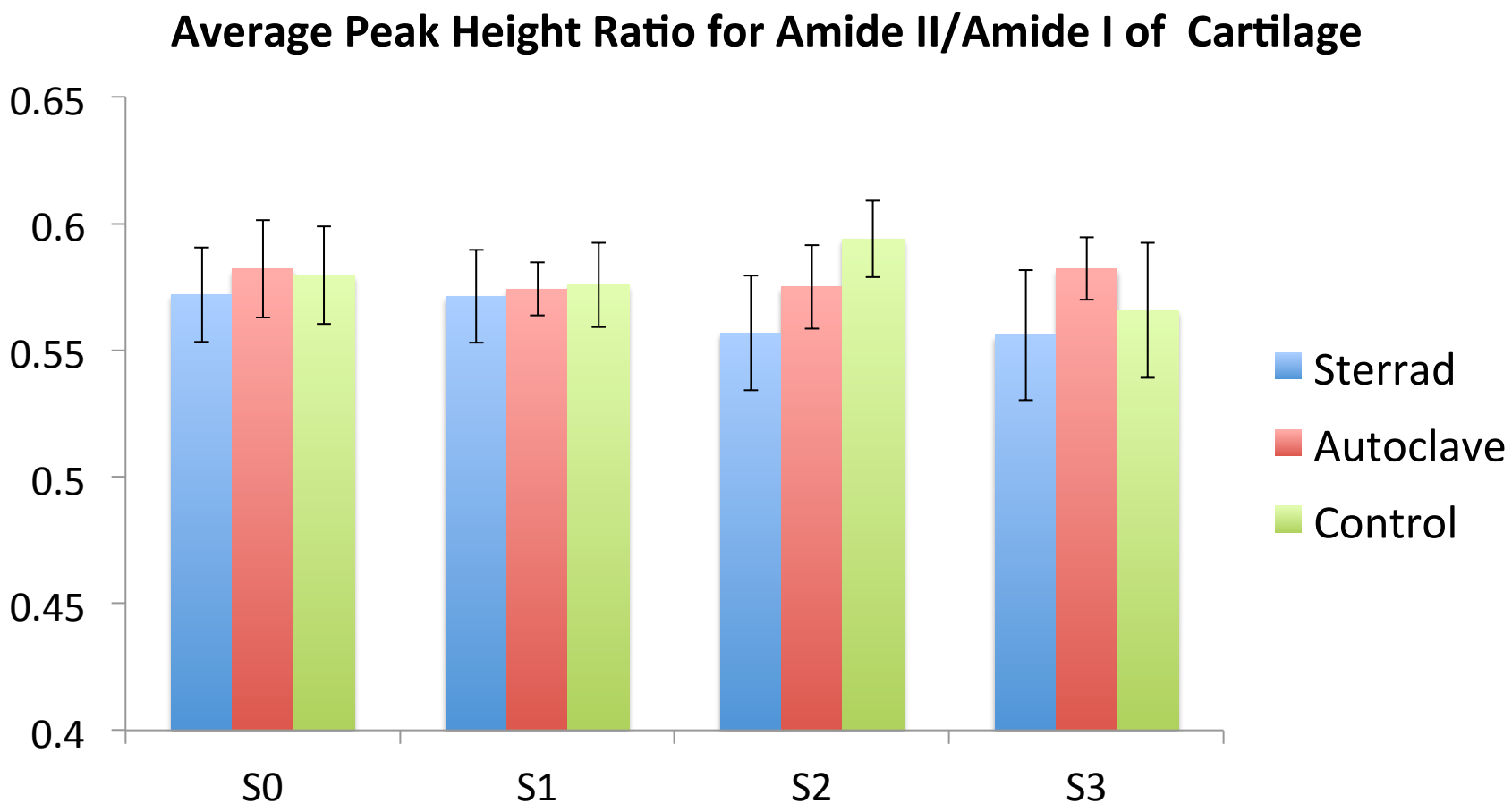


There were no changes observed in the control group's probe tips for all sterilization cycles.

Spectral overlay of bovine cartilage after sterilization cycle 1



The spectral overlay above of the Sterrad, autoclave and control group does not show any significant changes in the Amide I and II peak heights in bovine cartilage.



There were no significant changes in the peak height ratio of the bovine cartilage sample after each cycle of sterilization. This trend was seen in the 95% ethanol, ATR standard and patellar tendon sample (data not shown). The data suggests that Sterrad and autoclave did not have a significant effect on the optical properties of probe tips.

Conclusion

- Despite the visually changes in the tips after sterilization cycle one, there were no significant changes in the optical properties of the probe tips in the Sterrad® and autoclave group.

- We conclude that the Sterrad will be the better choice to sterilize the silver halide probe tips since only one probe tip out of five had a change in appearance after sterilization, while all the tips in the autoclave group appeared cloudy.