

Effects of sterilization on silver halide fiber optic probes

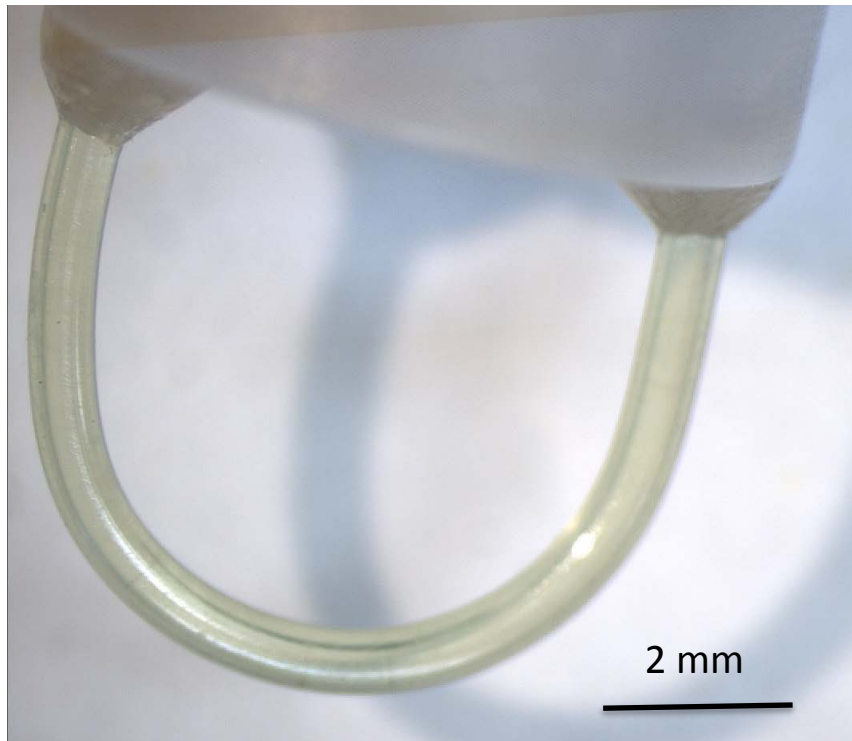


Method

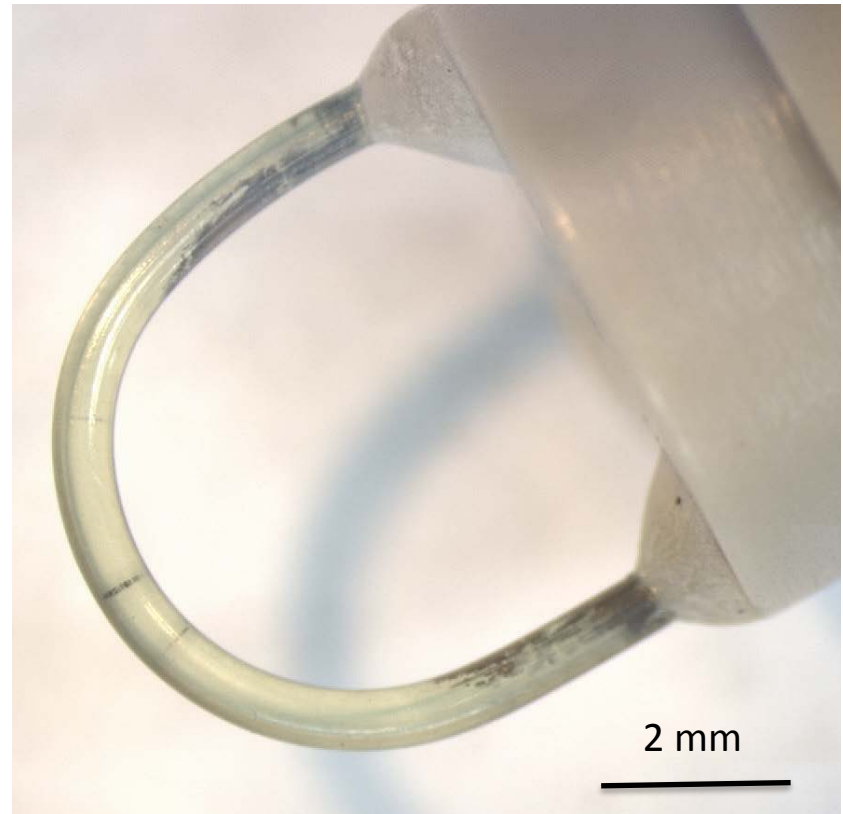
- Fifteen silver halide probe tips were divided equally into the Sterrad[®], autoclave and control groups.
- Sterilized the Sterrad[®] group three times using Sterrad[®]
 - Hydrogen peroxide gas plasma with an exposure time of 55 minutes
- Sterilized the autoclave group three times using the autoclave
 - 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

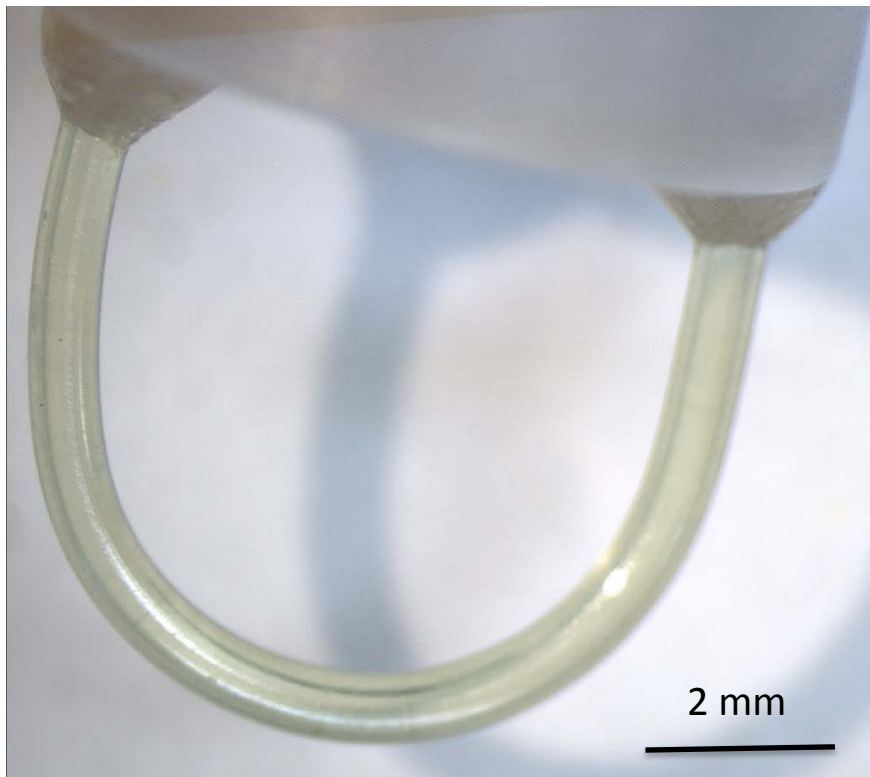
Silver halide probe tip 1 from Sterrad® group before sterilization



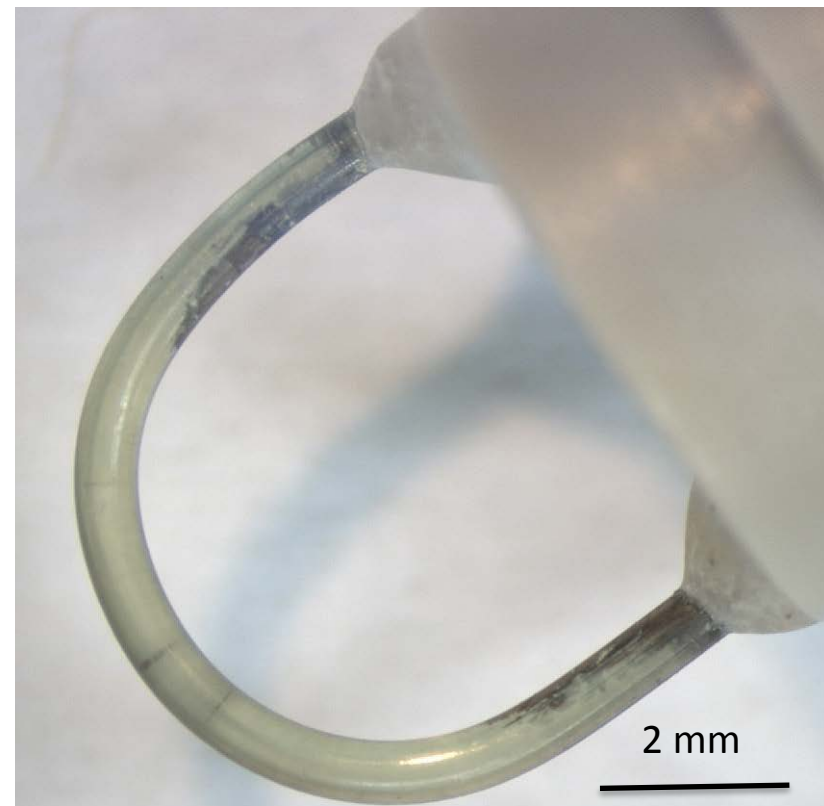
Silver halide probe tip 1 from Sterrad® group after sterilization cycle 1



Silver halide probe tip 1 from Sterrad® group before sterilization



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

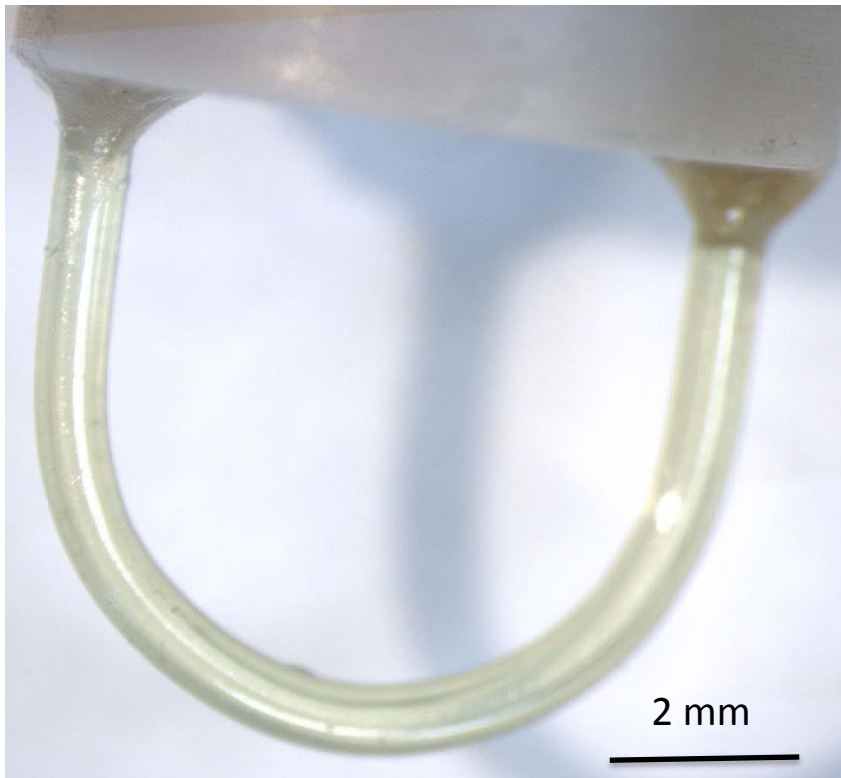


Summary of results for Sterrad[®] group

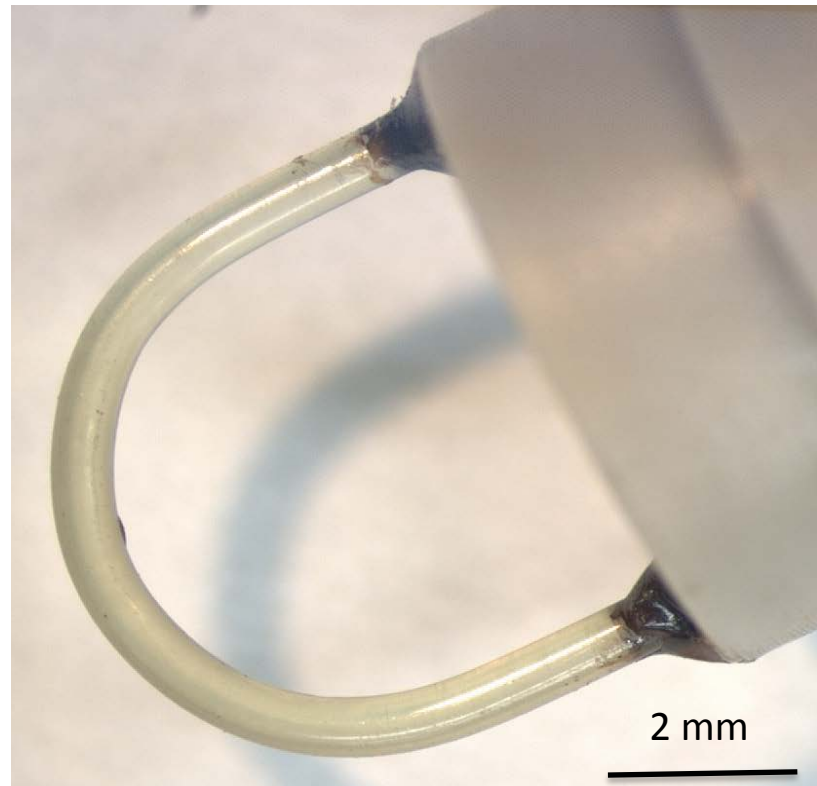
- A probe tip in the Sterrad[®] group became blackened at the two ends after sterilization cycle 1.
- The blackened effect was not observed in the remainder of the probes in the Sterrad[®] group.
- The epoxy resin, securing the fiber optic to the polymer mount, changed from a tan to a white color for all probes in the Sterrad[®] group.

Autoclave Results

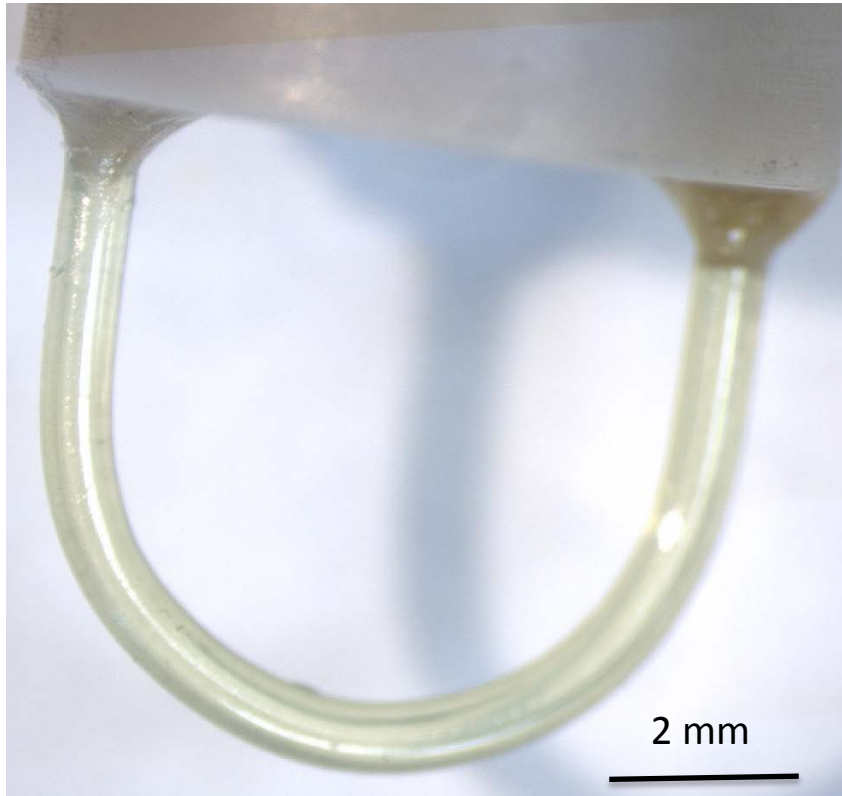
Silver halide probe tip 1 from autoclave group before sterilization



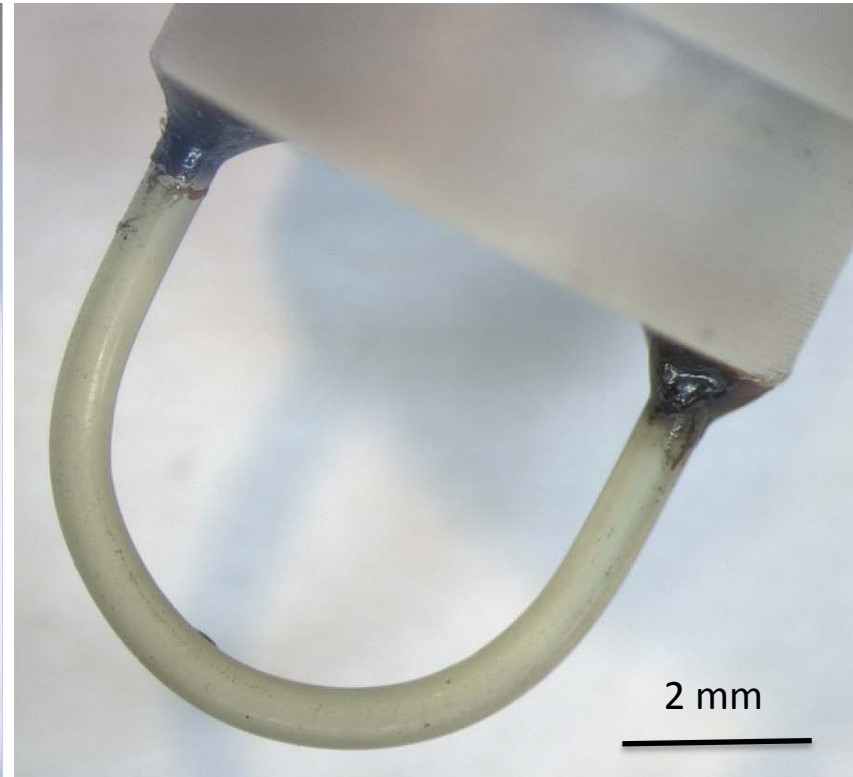
Silver halide probe tip 1 from autoclave group after sterilization cycle 1



Silver halide probe tip 1 from autoclave group before sterilization



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



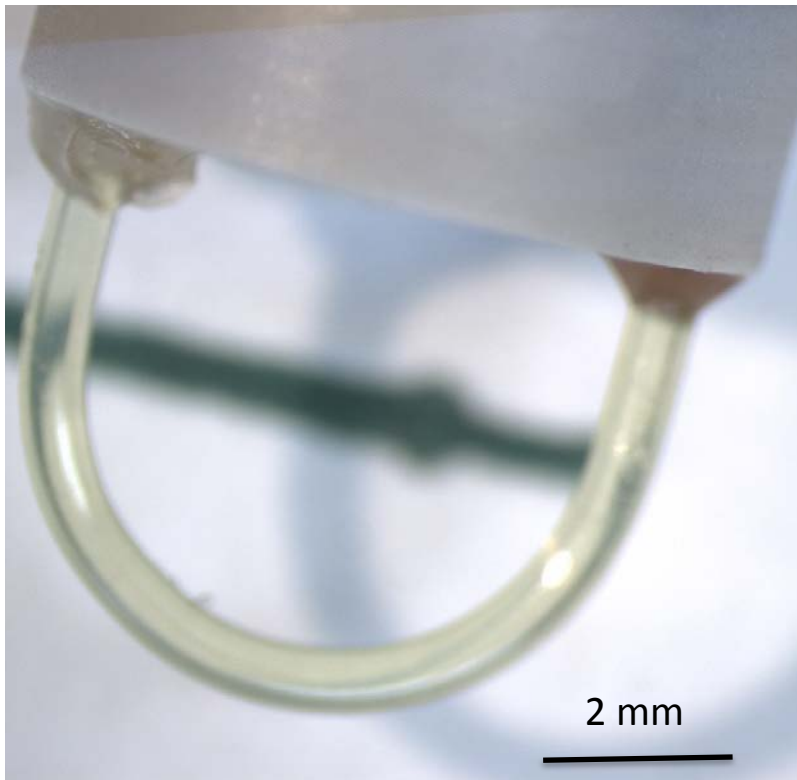
Summary of results for the autoclave group

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

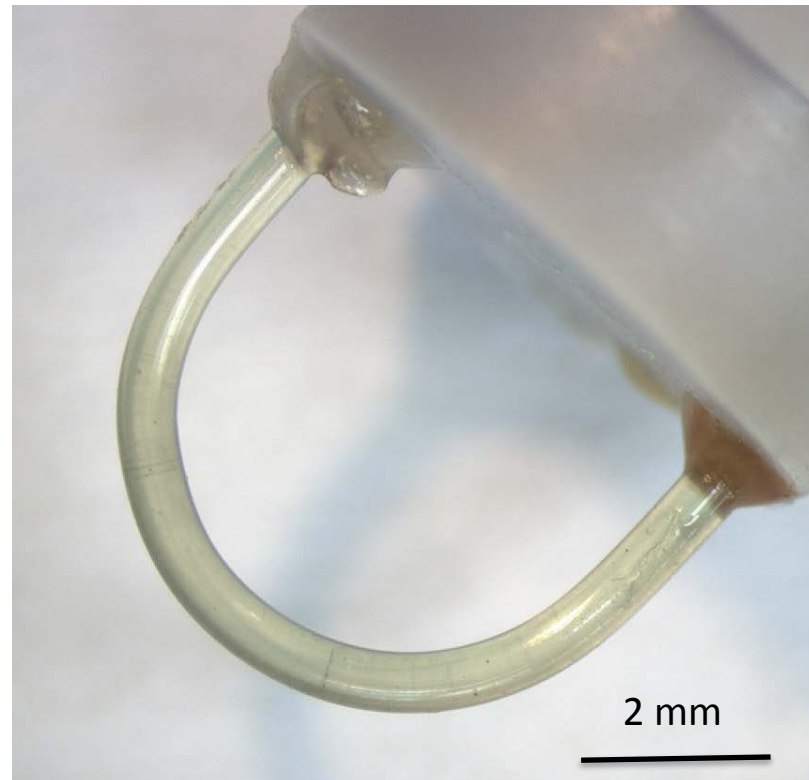
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Control Group Results

Silver halide probe tip 1 from control group before sterilization

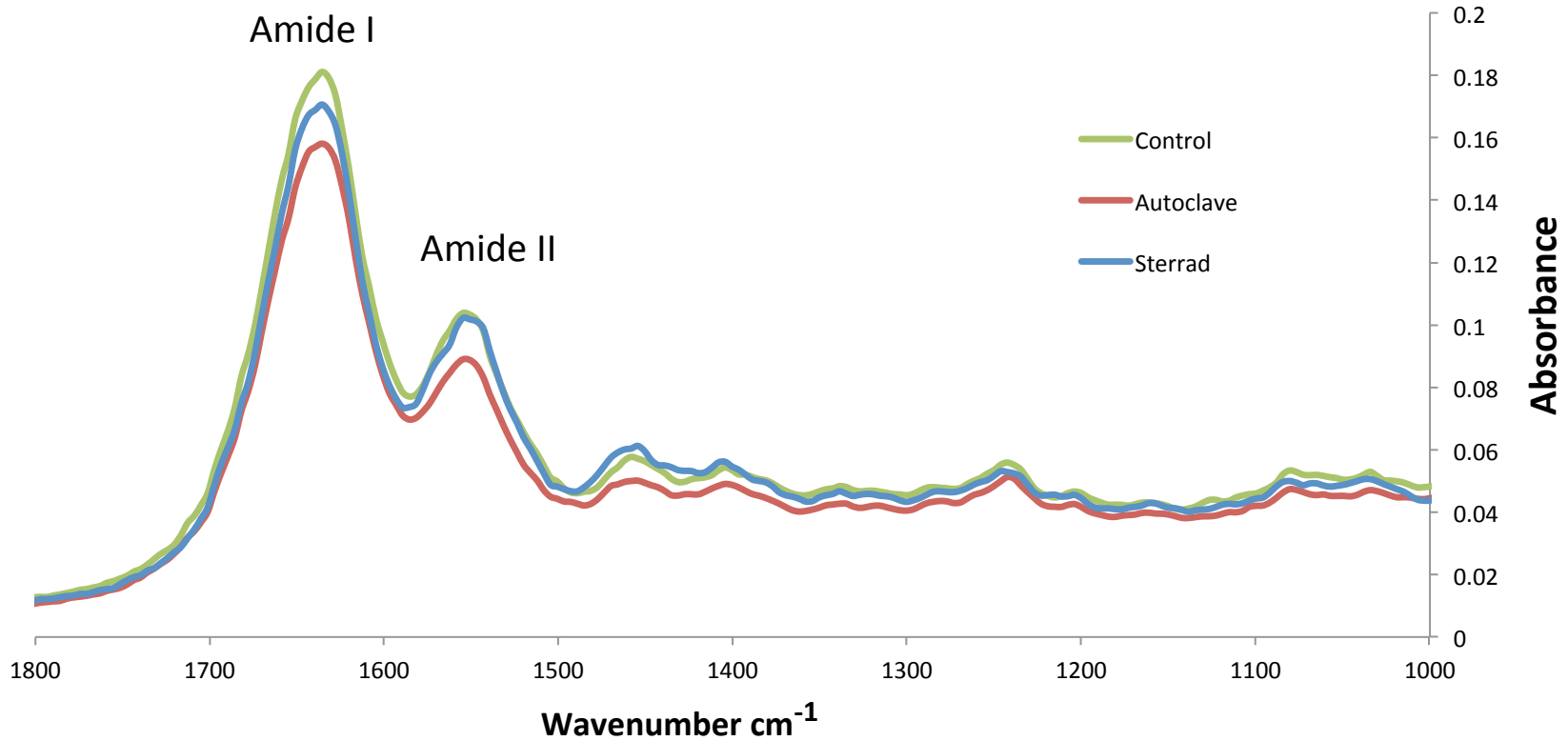


Silver halide probe tip 1 from control group after sterilization cycle 3



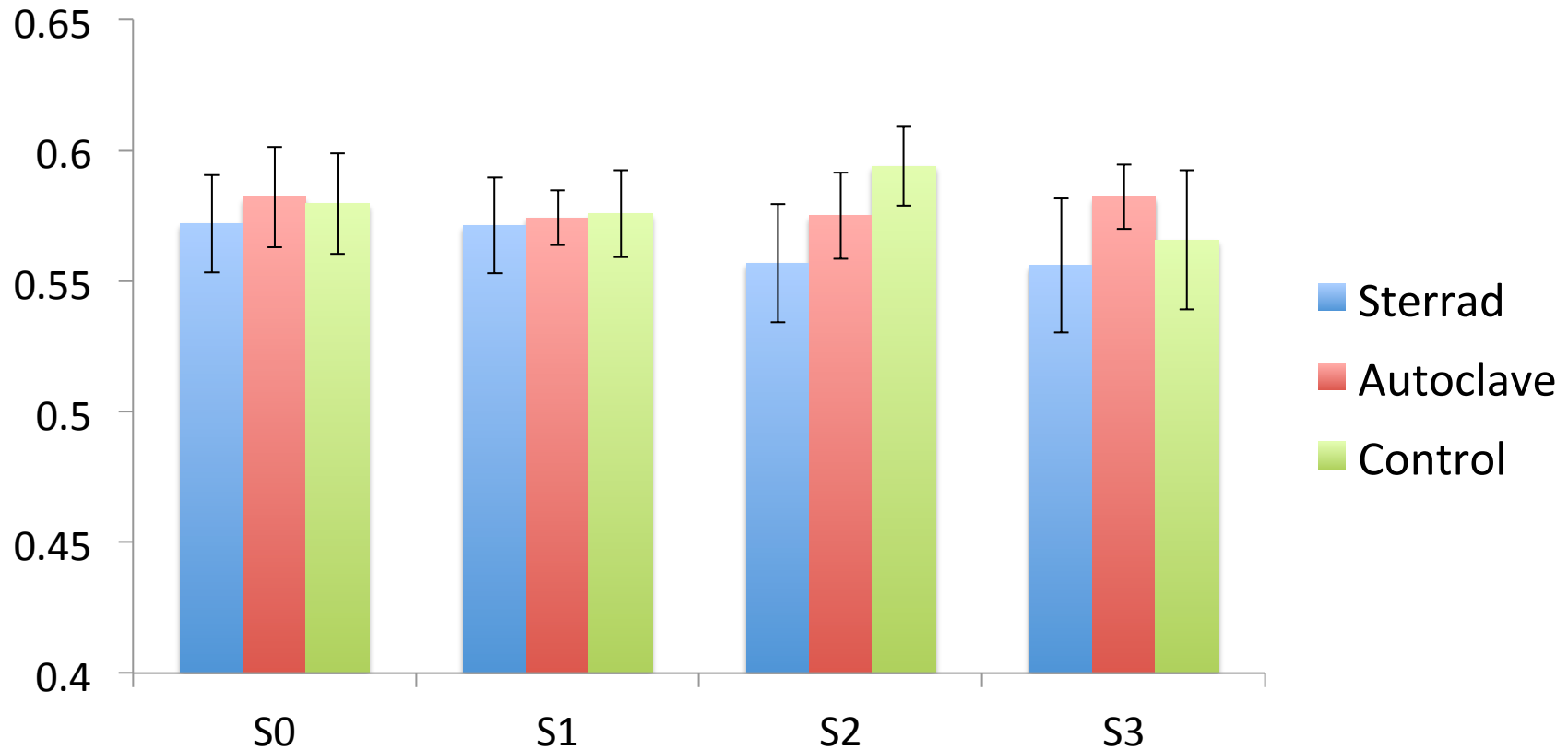
There were no changes observed in the control group's probe tips for all sterilization cycles.

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.

Average Peak Height Ratio for Amide II/Amide I of 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.