



## 5 Medical Device FAQs

 **Question: What characteristic of the bath do you try to optimize to minimize material removal?**

**Answer:** To minimize material but obtain the same level of shine on the medical device is a difficult question. We look at different components and their role in our electropolishes. However, this is less advanced than other Research and Development projects that we have. More can be accomplished on the engineering part by better structuring the voltage, current and cell geometry because these are also important.

 **Question: Why are there so many deoxidizers for Nitinol?**

**Answer:** There are so many different deoxidizers because there are so many different parts with different heating history, which leads to different oxide characteristics on the surface. It could be a thinner or thicker oxide. It could be a denser oxide. It could have flakier oxide layers. It all depends. Also, safety is a factor. Some customers just will not work with hydrofluoric acid-containing chemistry. If that is the case, we have other products for them.

 **Question: How do you electropolish Nitinol at room temperature, and how is this different from electropolishing at a very, at very low temperatures?**

**Answer:** There is a difference in setup. The same power supply can sometimes serve both cases, but in general these power supplies need to be capable of high voltages and low to intermediate currents. We work with a unit that is capable of 60 volts in the lab and up to five amps, and it's sufficient for Nitinol, to the extent that we can tell. Even though we typically go to like 40 volts, it's good to have that extra voltage of 60 volts.

The big difference is the temperature. You must maintain low temperatures to be able to produce some parts. These temperatures can reach upwards to minus 40 and minus 50 degrees Centigrade. For room temperature electropolishing, it could be room temperature up to 20 degrees. Some customers use it at slightly lower temperatures, like 10 degrees Celsius, but needs to be understood that as with standard electropolish, the solution will heat while processing parts because of high resistance of the medium. To control the steady conditions for electropolishing, you need to maintain room temperature or sub-room temperature. This means you need some chilling. It's in some ways similar, but maintaining temperatures at room temperature or near room temperature is much easier than having to heat and cool to low temperatures.

 **Question: : Do you have recommendations on eliminating small/localized unpolished areas (defects) for Nitinol electropolishing?**

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**Answer:** It must start with a step before electropolishing. The deoxidation process must be improved because deoxidation is where you get uniformity. If deoxidation is not done properly, there will be some areas that have a different material composition on their surface which will show up in electropolishing. You may need to increase tolerances for material removal in anticipation of those problems. Generally, more deoxidation and a greater attack of the of the base material will unify the surface.

 **Question: Have you ever worked with ammonium bifluoride for Cobalt Chrome etching?**

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**Answer:** When you put ammonium bifluoride in solution, you still have to add an acid because ammonia bifluoride will dissolve. It's not a strong etch unless there's acid present. You're essentially going to be adding some other acid, hydrochloric acid, even hydrofluoric acid in concert with that. At the end of the day, it's going to be how concentrated the fluoride ion is in the solution. Essentially, fluoride is fluoride. Temperature is going to have a role in the in the process, but if you don't have enough ionized fluoride (free fluoride), you're not going to have a very strong reaction taking place by itself.