

Studies in Additive Manufacturing Techniques for Pulsed Fusion Experiments

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Overview

Using Physical Vapor Deposition to coat a material in lithium for use in a pulsed fusion device.

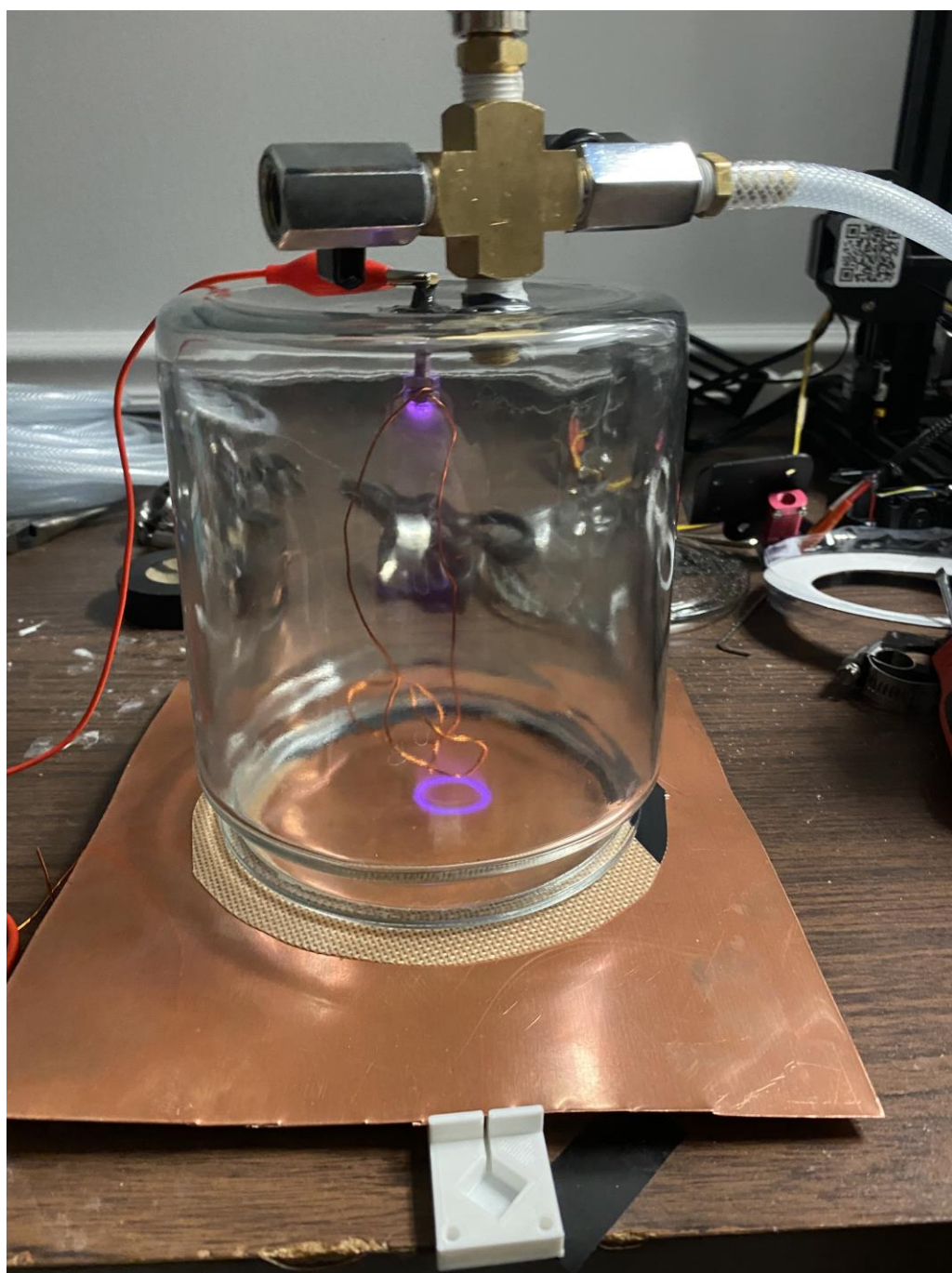


Figure 1

First prototype using Sputtering. Pressure was too high to make any coatings.



Figure 2

Second prototype setup using Thermal Evaporation. From right to left: welder, vacuum pump, vacuum chamber

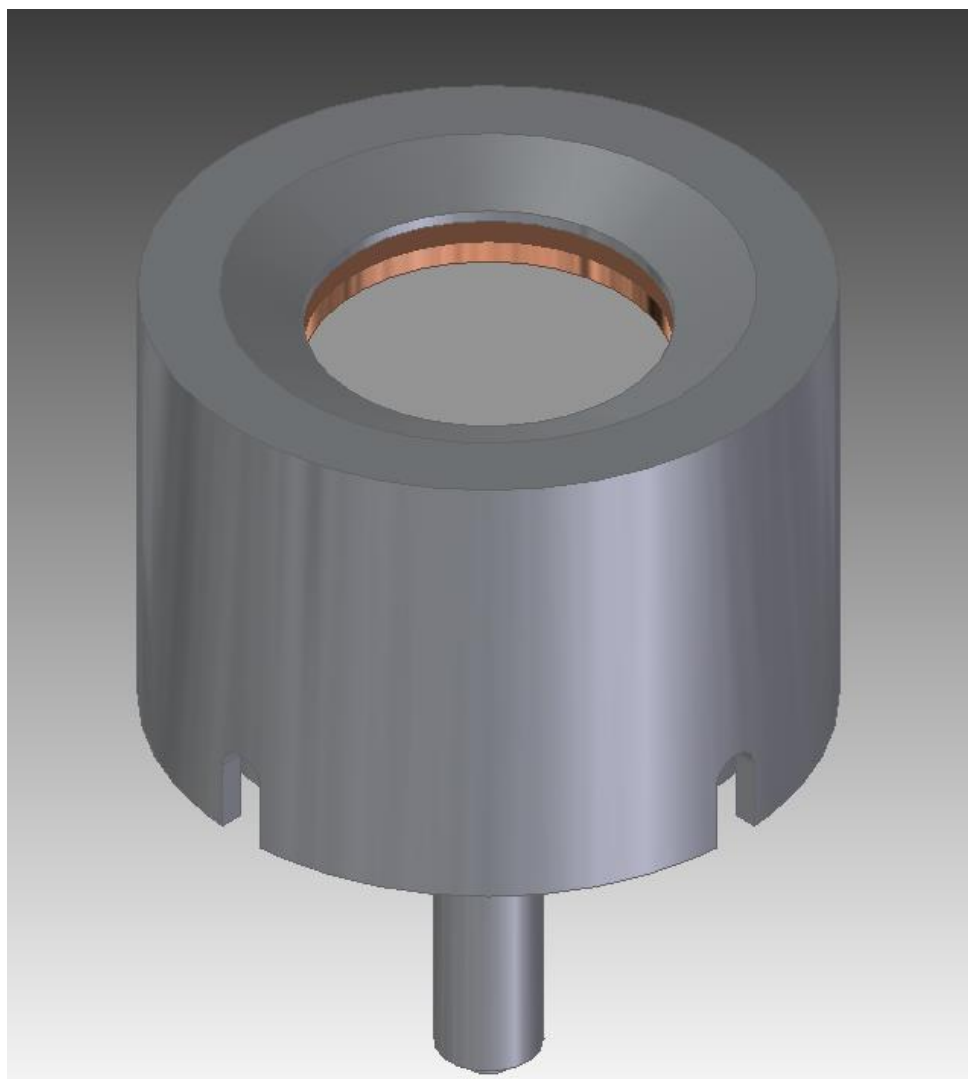


Figure 4 a.

Figure 4 a. is a CAD model of the future design of the Sputtering system that can incorporate standard 2" diameter sputtering targets. Will be made of copper and Stainless Steel.

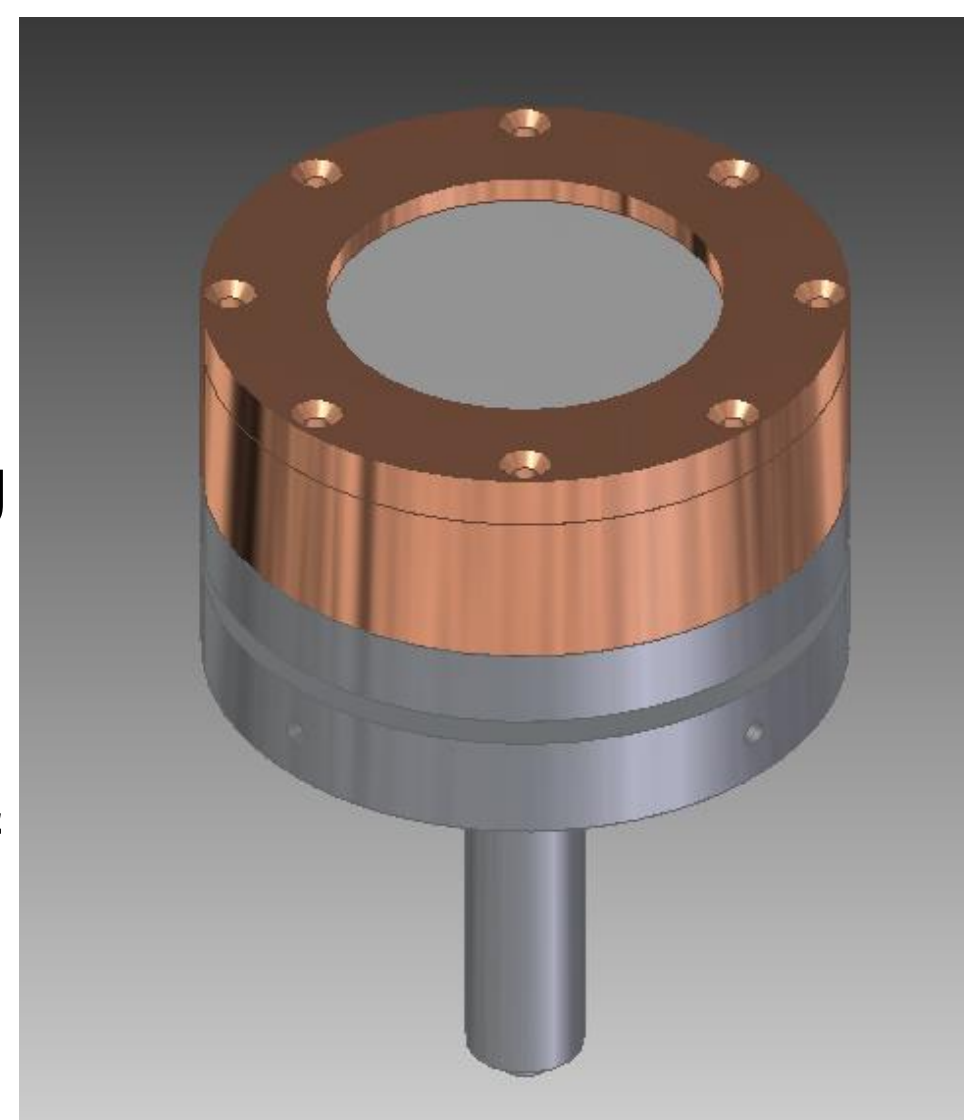


Figure 4 b.

Key Findings

During the project, two ideas were tested, Sputtering and Thermal Deposition. Both ideas were halted due to bad vacuum chambers and no coatings were produced.



Figure 3

Second prototype in action using copper pipe. Pressure was too high to make any coatings.

Figure 4 b. is the same CAD model but without the ground shield.

Conclusions

As the project never got to produce any metal coatings, more work will have to be done. The construction of a better vacuum chamber and sputtering system is in the works to produce cleaner and more accurate targets. Once lithium coatings can be produced, layering Lithium Deuteride and Lithium will be tested for more powerful fusion reactions.

Project Reasoning

With the ability to make lithium targets for pulsed fusion, it will allow for the acceleration of research in pulsed fusion which can bring new technology in propulsion, energy production, and security

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