

High – Throughput Thin Film Library Processing

Synthesizing and analyzing ion deposition thin film combinatorial libraries

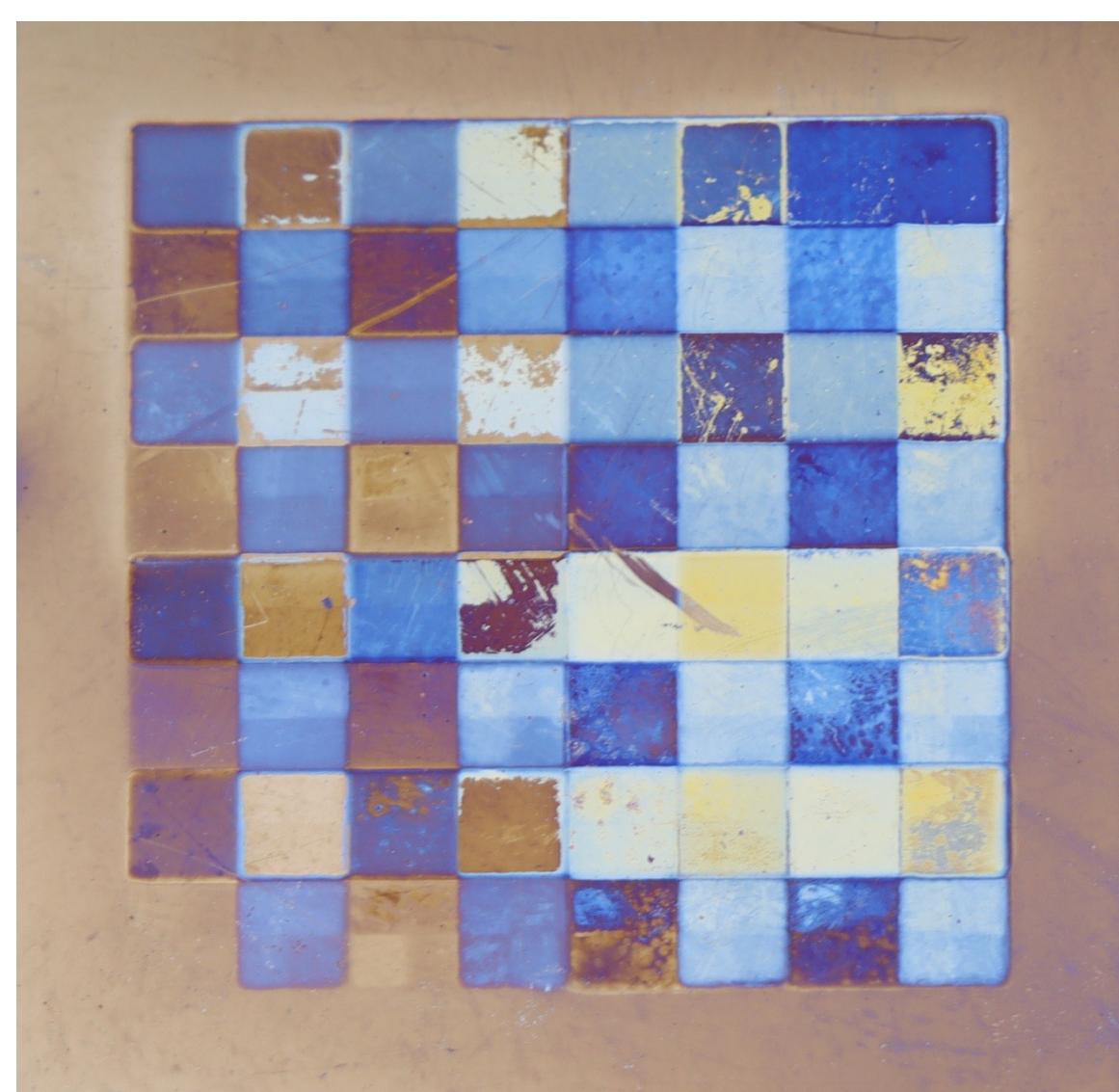
TECHNICAL CHALLENGE

Synthesize a complex combinatorial library using masked ion depositions and design a method by which all of the sample sites can be evaluated quickly

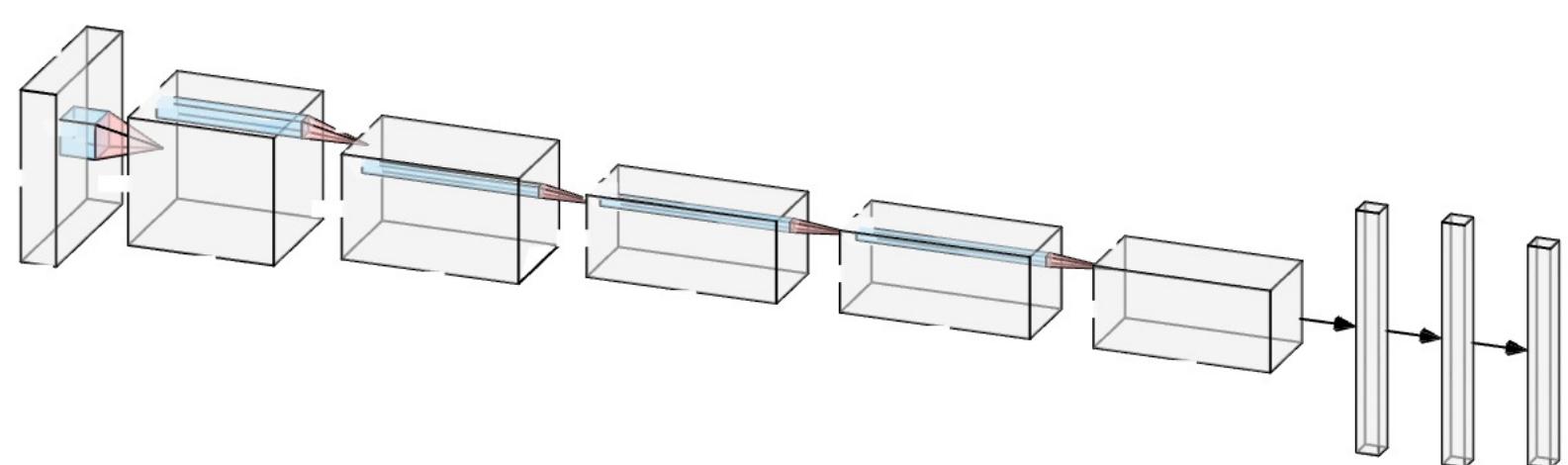
TECHNICAL APPROACH

- Create a series of masks that will facilitate the creation of an ion deposition library
- Determine a deposition order that will minimize the number of depositions while maintaining a minimum of 128 unique sample sites
- Develop a rig that will allow all the sample sites to be tested for physical properties quickly
- Analyze several optical properties quickly and quantitatively through various programs

RESULTS: PROGRESSION OF IMAGING A RESOLUTION TARGET



- A 16x16 library that was accomplished with 8 depositions
- Contains a host of materials known for phosphorescent properties
- Shows nice separation between sites



- Shows the structure of the neural network
- Identifies what a material is based on its visual properties

OVERVIEW: APPARATUS



- Top right: The masks used for depositions
- Top left: The automated testing setup
- Bottom: The ion deposition machine used to fabricate the samples

CONCLUSIONS

- The synthesis of the combinatorial library was successful, and it showed clear separation between the sample sites
- The material identification neural network was able to correctly identify, within a reasonable amount of accuracy, what materials a sample was made of, even through a wide range of picture conditions
- Our automated test stand was able to quickly and accurately, map all sites of our 16x16 sample and when combined with data collection software, was able to store and organize the data

FUTURE TESTING

- Use different combinations of materials to look for phosphorescent candidates
 - Due to the current state of material science, it is impossible to theoretically predict certain properties of a material, so they must be manufactured and then tested
- Advance the testing rig so that it can accommodate multiple different probes and switch between them automatically
- Test the neural network against increasingly complex pictures and in decreasingly ideal environments
- Develop a set of quaternary masks to allow for additional customization of the sample arrays