Materials for medical gowns undergo rigorous testing

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Tony Vindell performs one of the water tests on a fabric sample. Credit: John Eisele

As the COVID-19 pandemic continues to fill hospitals around the state, several Colorado manufacturers are hoping to shift gears and start making medical gowns for health-care professionals in need of personal protective equipment. They have turned to a high-tech textile laboratory at Colorado State University for its expertise in testing materials that could be used for the gowns.

CSU's Smart Textiles and Nanotechnology Research Group, led by Associate Professor Vivian Li in the Department of Design and Merchandising, is performing a variety of tests on fabrics that could be used for the medical gowns, assessing factors like durability, comfort, safety and health. Li, who has expertise in nanostructured materials for high-tech textiles and smart/intelligent medical textiles, teaches a senior-level course in product quality assurance for textiles. Tony Vindell, a Ph.D. student in materials science and engineering who spent more than three years testing textiles as a lab assistant for Cotton Incorporated in North Carolina, is also part of the research group.

"We feel so lucky to have him," Li said. "He's experienced, and he's willing to help, which is great because everybody's trying to get these tests going in a very short timeframe."

"It's exciting, crazy and hectic, all at the same time," Vindell added. "One company reached out to CSU because Dr. Li's lab is the only lab in the state that can do this kind of testing."

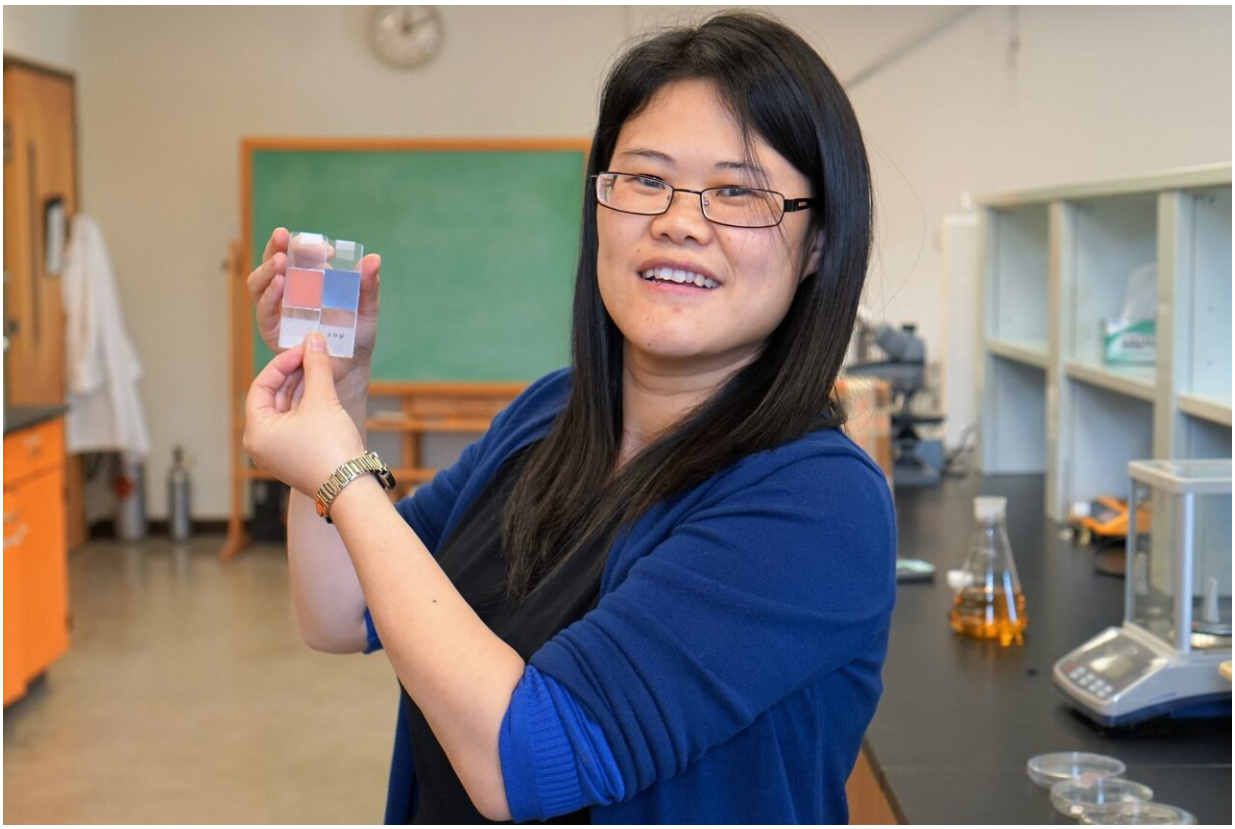
Twofold objective

Li said the objective is twofold: help companies choose the right type of material to manufacture the gowns, and then test the completed gowns to ensure they meet standards for personal protective equipment (PPE) set by the Food and Drug Administration, ASTM International and the American Association of Textile Chemists and Colorists.

Vindell started examining samples the week of March 30, beginning with strength/tensile testing to assess things like how much force is required to pull it apart, tear it and separate seams.

"These tests don't require large samples," Vindell explained. "But there are only so many spots that have seams, for instance, and you want smooth samples without a lot of creases, because force can be concentrated on creases, which can give false data."

Tests on water repellency, water resistance and water vapor transmission were scheduled to begin this week. Future plans call for testing flammability, bloodborne pathogen penetration and hydrostatic pressure testing. Li described the latter test as covering one end of a pipe with fabric and pumping in water from the other side, to see how well the fabric withstands the pressure. Federal regulations require flammability testing for all textile products, and a higher level of classification is required for medical gowns.



Associate Professor Vivian Li. Credit: Colorado State University

Li expressed gratitude to Karen Hyllegard, the head of the Department of Design and Merchandising, who helped move some of Li's student advising duties off her plate to make time for the project, which is being coordinated by Colorado Gov. Jared Polis' task force on PPE.

"I'm so glad I'm able to be part of this," Li said. "Everyone wants to help at this point—it's devastating to see what's going on with this pandemic. We have to do whatever we can to assist."

Adding to core facilities resources

Some of the tests require specialized equipment that CSU has procured with funding from the university's Office of the Vice President for Research. Ultimately, this equipment will be housed in the School of Advanced Materials Discovery's materials characterization emerging core facility. Core facilities are shared research resources, accessible to all CSU researchers, that also serve external partners.

"Increasing and sharing our capability to do this testing for the state of Colorado is just one more example of how CSU has contributed to efforts to address all aspects of the pandemic," said Ellen Fisher, assistant vice president for strategic initiatives for the OVPR. "I am truly grateful to both Dr. Li and Tony Vindell for stepping up and lending their expertise to this important endeavor."

"Being able to try to help during this time is great," Vindell said. "It's just kind of surreal being one of the only ones on campus right now."

Provided by Colorado State University