



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

Name(s) Amber I. Hess	Project Number S0509
Project Title Enhanced Color Thin-Layer Chromatography: A Novel, New Technique to Extend the Chemist's Venerable Chromatography Tool	
Abstract Objectives/Goals Thin-layer chromatography (TLC) is a widely used method to determine the number of components in a mixture and/or their identity, to monitor the progress of a reaction, or to determine the effectiveness of a purification. In my science fair project last year I reported the ability, using digital photography and color enhancement, to detect color in a chemical's spot on fluorescent TLC plates. The objective of this project is to develop this new Enhanced Color TLC technique by determining the source of the color, whether the color can be detected in a variety of chemicals, and under what conditions one can see this color. Methods/Materials Fluorescent chemicals were spotted on fluorescent TLC plates and then placed in a TLC chamber. A digital picture was taken of each TLC plate with a digital camera under 254 nm UV light. Photo-editing software was used to enhance the colors in the pictures to determine if the chemical's fluorescence could be identified. Certain colors in the picture of a TLC slide may not be visible to the human eye, but the camera and computer can pick them out. Results My research and results show that the source of the color is fluorescence. If a fluorescent chemical is spotted with a high enough concentration on a fluorescent TLC plate, photo-editing software can be used to enhance the colors in a picture of the plate and the fluorescence from the chemical's spot can be seen. I found that many fluorescent chemicals can be detected with Enhanced Color TLC at reasonable concentrations. TLC spots can be differentiated from one another with this distinctive Enhanced Color TLC method. Conclusions/Discussion While many techniques in chromatography take advantage of color, a literature search showed that no one else had reported the ability to combine the use of color AND fluorescent TLC plates, which normally show a chemical sample as nothing more than a black spot on a green or blue background. The ability to detect color from samples on a fluorescent TLC plate is valuable because chemists now have another easy technique besides R _f values to verify the identity of chemicals. By effectively using Enhanced Color TLC, chemists can save time and avoid using more expensive methods. Indeed, TLC is popular because of its low cost and simplicity, and Enhanced Color TLC stays true to these valued qualities. Enhanced Color TLC is a novel, new tool that can be added to a chemists TLC toolbox.	
Summary Statement Enhanced Color Thin-layer Chromatography is a novel, new technique to identify fluorescent chemicals by using traditional TLC and digital photography.	
Help Received Dr. Kimberley R. Cousins at CSU San Bernardino offered advice and answered questions.	