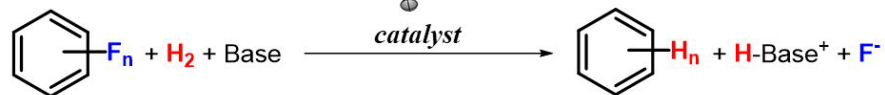
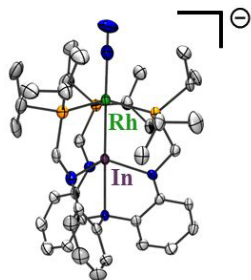
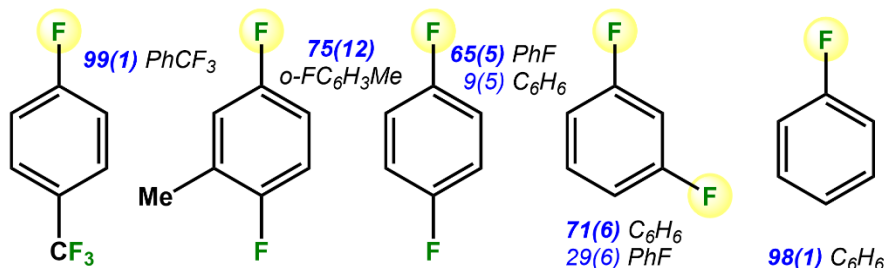
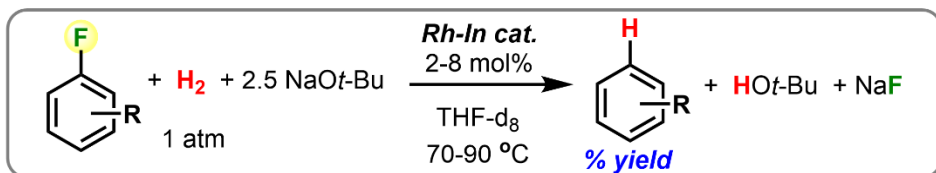


Connie Lu, University of Minnesota, Twin Cities, 1800110
 Breaking the strong carbon-fluorine bond



✓ **H₂ as reductant** ✓ **Cheap alkoxide bases**
 ✓ **Unactivated fluoroarenes**



Images are extremely important to publicize the results of NSF investments. Select images or photographs that best represent or capture the essence of the project outcome reported for this Highlight. Insert images in JPEG, GIF, or TIF if possible. Provide a caption which clearly describes the image in lay terms with limited technical jargon. Provide a credit for all images. Videos that can enhance understanding for a general audience are welcome.

E-mail the Highlight to the Division of Chemistry at: chemhighlights@nsf.gov

A Rh-In catalyst has been discovered to transform aryl C-F bonds to C-H bonds using hydrogen gas. The process of removing the F atom in an organofluorine and replacing it with a H atom is called hydrodefluorination. This process is important for treating organofluorines to render them less harmful. The use of hydrogen in hydrodefluorination is key to boosting the sustainability and efficiency of the process.

Top figure shows the catalyst and a generalized hydrodefluorination reaction. Bottom figures illustrate the efficiency of the catalyst for various organofluorines. Images are reproduced in part with permission from *J. Am. Chem. Soc.* **2020**, *142*, 27, 11641–11646. Copyright 2020 American Chemical Society.

Organofluorines, organic compounds containing C-F bonds, are almost all man-made chemicals and are widely used as pharmaceuticals, refrigerants, agrochemicals, and surfactants. The C-F bond is one of the strongest in organic chemistry, giving rise to some of the desirable properties of organofluorines. Unfortunately, this same property also renders them nearly indestructible. Organofluorines, in particular perfluoroalkyl substances (PFAs), are now recognized to persist and accumulate in the environment and can be highly toxic to animals and humans.

This discovery began with a lucky accident. During the crystallization of a naked Rh-In complex in a solvent mix of fluorobenzene and benzene, a new complex with a Rh-C(Ph) bond was found. Researchers were able to capitalize on this serendipitous finding to develop their hydrodefluorination process. The work was performed by James Moore and Dr. Connie Lu at the University of Minnesota. The work is funded by the National Science Foundation, Directorate of Mathematical and Physical Sciences to Connie Lu through the Chemical Synthesis Program in the Division of Chemistry.