Lab to Plant initiative with ReactIR: Control Residual Isocyanates in Polyurethane Polymerizations

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Isocyanates are critical building blocks for high performance polyurethane based polymers that make up coatings, foams, adhesives, elastomers, and insulation. With demand expanding globally, the market for isocyanates is expected to grow to $39 billion by 2019.

Controlling isocyanate reactions begins with process understanding. Yet, traditional analytical methods for measuring the residual isocyanate (NCO) concentration using offline sampling and analysis introduces concerns such as:

- Long wait times for offline analytical results making it impossible to make real-time decisions, leading to inconsistent product quality and reduction in production capacity
- Sufficient process knowledge lacking at any given time point
- Exposure to NCO samples increasing the risk of sensitization and human health risks

In situ monitoring with process analytical technology addresses these challenges. Specifically, *in situ* mid-IR spectroscopy with an attenuated total reflectance (ATR) sensor is an ideal choice due to its selectivity and sensitivity.