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Imprinting technology for advanced engineering separations

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Molecular imprinting is a technique to design robust molecular recognition materials able to mimic natural recognition entities, such as antibodies and biological receptors. A target compound is present during the polymerization process acting as a molecular template. Building blocks featuring complementary functional groups to the template allow self-assembly of the host-guest system through either secondary or covalent interactions. The functional groups are held in position by the result of high degree cross-linking polymerisation. Subsequent removal of the template by solvent extraction or chemical cleavage leaves binding sites that are complementary to the template in terms of size, shape and arrangement of functional groups. Imprinted materials can be fabricated in both resin and membrane formats and used for various applications requiring molecular level separations. The keynote address will cover molecular imprinted materials from fabrication to process applications. Examples from downstream processing of active pharmaceutical ingredients, catalysis, chiral separations and wastewater treatment will be given. Imprinted materials offer unique separations including three-way fractionation of solutes in organic media. Nevertheless, most real-world applications are limited to analytical chemistry, and large scale industrial applications are yet to be broken through. The drawbacks and future of imprinting technology from a chemical engineer's perspective will be presented.

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Predictive analytics for the process industry goes far beyond asset monitoring. Is your process historian still up for the task?

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For years now we have been searching for the holy grail of analytics in the process industry. Every big data solution has tried to crack the key to unlock predictive and prescriptive analytics, having the system to tell you what you should be doing. Very rarely we have seen success here. The only place where we have some success is where a very specific question with a specific resolution can be repeated indefinitely. This could work when you have thousands of identical assets, like pumps or windmills. But this does not work for the chemical process. In the chemical industry, engineers deal with dozens of different processes at a time, each reacting differently to internal and external variables. This makes repeating an exact question to an exact solution impossible. For this we will need a completely different approach. This is also the very reason why this cannot be done by a data scientist but by the engineer himself. In this presentation, I will lay some foundations on why existing big data solutions will not suffice for the process industry, why the data historian is not the place to be and why the data scientist is not your next new hire. At the end of this presentation, I will show a short live demo of TrendMiner, one of the new solutions that will help the process engineer get the information out of his data.

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