

## Electrical capacitance tomography and its industrial applications

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Among various industrial tomography modalities, **electrical capacitance tomography (ECT)** is the most mature and has been used for many challenging applications. ECT is based on measuring very small capacitance from a multi-electrode sensor and reconstructing the permittivity distribution in a cross section of an industrial process. Compared with other tomography modalities, ECT has several advantages: no radioactive, fast response, both non-intrusive and non-invasive, withstanding high temperature and high pressure and of low-cost. Because of very small capacitance to be measured (much smaller than 1 pF) and the “soft-field” nature, ECT does present challenges in capacitance measurement and solving the inverse problem. The latest AC-based ECT system can generate online images typically at 100 frames per second with a signal-to-noise ratio (SNR) of 73 dB. During this seminar, ECT principle will be discussed, and the AC-ECT system will be introduced. Examples of industrial applications, in particular imaging fluidised beds for pharmaceutical manufacturing, clean coal combustion and methanol-to-olefin conversion, will be discussed. Future developments will also be highlighted.

**Wuqiang Yang (FIEEE, FIET, FInstMC)** graduated from Tsinghua University. Since 1991, he has been working with UMIST and The University of Manchester in the UK. He became Professor of Electronic Instrumentation in 2005. His main research area is ECT and its industrial applications. His technical achievements and social impact are indicated by the fact that many companies and universities use his ECT instrument, to deal with challenging problems, such as multiphase flow measurement. He has published >400 papers and two books with an h-index of 58. He is an Associate Editor of *IEEE Open J. IM*, and *IET Sci. Meas. Technol.*, and editorial board member of *Meas. Sci. Technol.*, and visiting professor at several universities. He received several national awards, including 2021 IEEE IMS Best Application Award. He was an IEEE Distinguished Lecturer from 2010 to 2016, and one of key organizers of *IEEE IST Conference* for many years. His biography has been included in *Who's Who in the World* since 2002.