Mary J. Wirth is the W. Brooks Fortune Distinguished Professor in the Department of Chemistry at Purdue University. She is a native of Joliet, IL. She received her bachelor's degree in 1974 from Northern Illinois University, where she did undergraduate research under the direction of Alfred A. Schilt. She earned her doctorate in 1978 from Purdue University, working under the direction of Fred E. Lytle. She was on the chemistry faculties at the Universities of Wisconsin-Madison, Delaware, and Arizona, and she also spent two years working at Lawrence Livermore National Laboratory.

Wirth's interests span the fields of bioanalytical chemistry and materials science. Her research has been recognized by national awards that include the ACS Analytical Division Award in Spectrochemical Analysis, the EAS Gold Medal Award in spectroscopy, the ANACHEM Award, and the EAS Award for Outstanding Achievements in the Fields of Analytical Chemistry. She is a Fellow of the Society of Applied Spectroscopy and a Fellow of AAAS. She is a founding member of the Advisory Board for COACh, which provides workshops for women all around the world who aspire to academic careers in science and engineering.

One of the most important challenges in analytical chemistry today is to increase the resolution and speed of protein separations. The need is driven by the growing use of biotechnology in the pharmaceutical industry, the opportunities in understanding disease processes through proteomics, and the dearth of protein biomarkers for cancer diagnostics. These three lectures detail what happens to resolution and speed in protein separations when homogenous materials with nanoscale interstitial dimensions are used.

This first lecture probes the nanoscale phenomena that arise when monodisperse colloidal silica is used as a building block for chromatographic and electrophoretic media. The phenomena include formation of colloidal crystals, the restricted accessibility of proteins to the interstitial volume, and the onset of slip flow. Manifestations of these phenomena are presented and discussed in the context of opportunities in speed and resolution of protein chromatography and electrophoresis.