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The continuous separation of molecules on the basis of their polarizability using optical electric fields

Nicolas J. Alvarez,¹ Claus Jeppesen,² Kresten Yvind,² N. Asger Mortensen,² Iwao Teraoka,³ and Ole Hassager⁴

¹*Department of Chemical and Biochemical Engineering, Technical University of Denmark, Lyngby 2800, Denmark, nial@kt.dtu.dk*

²*Photonics Department, Technical University of Denmark, Lyngby 2800, Denmark*

³*Chemical and Biological Science, New York University Polytechnic, New York, New York*

⁴*Department of Chemical and Biochemical Engineering, Technical University of Denmark, Lyngby 2800, Denmark, oh@kt.dtu.dk*

We introduce a new and revolutionary way to separate macromolecules. The principle is to use light to selectively retain some molecules over others depending on their differential interaction with optical fields. We call the method Photonic Waveguide Chromatography (PWC), as it combines photonic waveguides and a flow channel that constitutes a "column" of conventional liquid chromatography. This presentation will focus on the underlying physics and our current theoretical efforts to characterize the parameter space of this process: considering both the design of the optical electric fields and the fluid dynamics needed to effectively separate molecules. This new method has a higher selectivity than traditional techniques and avoids the problem of fouling. The theoretical separation efficiency and resolution of PWC will be compared to other chromatographic techniques for various macromolecular and biological systems.