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## New strategies for (biological) particle handling and separation in microfluidic devices

Jellema, Laurens-Jan Cornelis

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# **New Strategies for (Biological) Particle Handling and Separation in Microfluidic Devices**

**Laurens-Jan Cornelis Jellema**

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Beoordelingscommissie: Prof. dr. H.W. Frijlink  
University of Groningen  
Prof. dr. T. Laurell  
Lund University  
Prof. dr. J. Westerweel  
Delft University of Technology

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Nobody said it was easy.  
*Coldplay, the Scientist*

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## List of Abbreviations

A	Cross-sectional area	MEMS	Microelectromechanical systems
$b_0$	Width at the beginning of diverging geometry	Pa	Pascal
bp	Base pair	Pe	Peclét number
B	Applied flux density of magnet	PCR	Polymerase chain reaction
cm	Centimeter	PDMS	Poly(dimethyl)siloxane
CAD	Computer Aided Design	PF	Pressure-driven flow
d	Distance	PFF	Pinched flow fractionation
D	Diffusion coefficient	r	Radius
Da	Dalton	R	Resistance
E	Applied electric field	$R_{tot}$	Total resistance
$E_{narrow}$	Electric field in narrow channel	Re	Reynolds number
$E_{wide}$	Electric field in wide channel	s	Second(s)
EDL	Electrical double layer	SNP	Single-nucleotide polymorphism
EOF	Electro-osmotic flow	t	Time
F	Force	T	Temperature
FFE	Free-flow electrophoresis	u	Linear velocity
FFIEF	Free-flow isoelectric focusing	$u_0$	Maximum linear velocity
FFIRP	Free-flow isotachopheresis	v	Velocity
FFZE	Free-flow zone electrophoresis	$v_{app}$	Apparent velocity
FIET	Flow-induced electrokinetic trapping	$v_{app,comb}$	Apparent combined velocity
k	Boltzmann constant	$v_{eo}$	Electro-osmotic velocity
h	Height	$v_{ep}$	Electrophoretic velocity
HDC	Hydrodynamic chromatography	$v_p$	Particle velocity
HDF	Hydrodynamic filtration	$v_{PF}$	Pressure driven velocity
i	Current	$v_{PF,MAX}$	Maximum measured pressure driven particle velocity
I	Ionic strength	V	Volt(s)
IEF	Isoelectric focusing	w	width
L	Length	Å	Angström
m	Slope	$\beta_c$	Compressibility of particles
mL	Milliliters(s)	$\beta_w$	Compressibility of medium
ms	Millisecond(s)		

$\rho$	Solution resistivity
$\rho_c$	Density of the particle
$\rho_w$	Density of medium
$f$	Frictional constant
$\eta$	Viscosity
$\mu\text{TAS}$	Miniaturized total analysis system
$\mu\text{m}$	Micrometer
$\epsilon$	Dielectric constant
$\epsilon_0$	Vacuum permittivity
$\mu$	Mobility
$\mu_0$	Permeability of a vacuum
$\mu_{\text{EOF}}$	Electro-osmotic mobility
$\mu_{\text{ep}}$	Electrophoretic mobility
$\zeta$	Zeta-potential
$\zeta_w$	Zeta-potential at the wall
$\zeta_p$	Zeta-potential of a particle
$\phi$	Acoustic contrast factor
$\Phi$	Particle flux
$\nabla \cdot B$	Gradient in the magnetic field flux
$\Delta\chi$	Difference in magnetic susceptibility between the particle and the fluid
$\Delta p$	Pressure difference
$\kappa^{-1}$	Debye length

