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Title:	Trade-off between carbohydrates and metal ions regulates the chemotactic directionality of alkaline phosphatase
Authors:	Akshi, Deshwal (/jspui/browse?type=author&value=Akshi%2C+Deshwal) Shikha (/jspui/browse?type=author&value=Shikha) Maiti, Subhabrata (/jspui/browse?type=author&value=Maiti%2C+Subhabrata)
Keywords:	carbohydrates and metal ions chemotactic directionality alkaline phosphatase
Issue Date:	2022
Publisher:	Royal Society of Chemistry
Citation:	Chemical Communications, 58(92), 12851-12854.
Abstract:	Herein we report the chemotactic behaviour of alkaline phosphatase (ALP) in the gradients of carbohydrates (glucose, fructose and sucrose) and metal ions, including cofactors (Zn <sup>2+</sup> and Mg <sup>2+</sup> ), under microfluidic conditions. We found that ALP migrates marginally away from the carbohydrate gradient, whereas for divalent metal ions, the direction is opposite and more prominent. This differential phoresis is due to the Hofmeister effect driven change in the ALP surface zeta potential and osmotic pressure imbalance. Gaining control over the chemotactic extent and direction of an enzyme in response to purely non-catalytic conditions will have potential application in designing environment-responsive nanomachines. Biomolecular behaviour, especially related to taxis in response to chemical gradients at nano- and microscale environments, is gaining attention across disciplines owing to their importance in spatiotemporal control over biological processes and stimuli responsive nano/micromachines. <sup>1</sup> In this context, understanding the chemotactic ability and directionality in the presence of their substrate gradients is one of the discussed topics since the last decade. <sup>2</sup> Mounting evidence suggests that the mobility of enzymes increases during the catalytic process, although there are contradictory reports that do not support this theory. <sup>3</sup> Nonetheless, the extent of chemotactic drift and directionality are two fundamental facts that are important in predicting and designing biochemical spatiotemporal response patterns in the micro- to macroscale.
Description:	Only IISERM authors are available in the record.
URI:	DOI <a href="https://doi.org/10.1039/D2CC04360B">https://doi.org/10.1039/D2CC04360B</a> (DOI <a href="https://doi.org/10.1039/D2CC04360B">https://doi.org/10.1039/D2CC04360B</a> ) <a href="http://hdl.handle.net/123456789/4844">http://hdl.handle.net/123456789/4844</a> ( <a href="http://hdl.handle.net/123456789/4844">http://hdl.handle.net/123456789/4844</a> )
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