**NEW FIGURES (3) : Importance of the Dielectric Friction Effect on the Conductivity of Polyelectrolytes**

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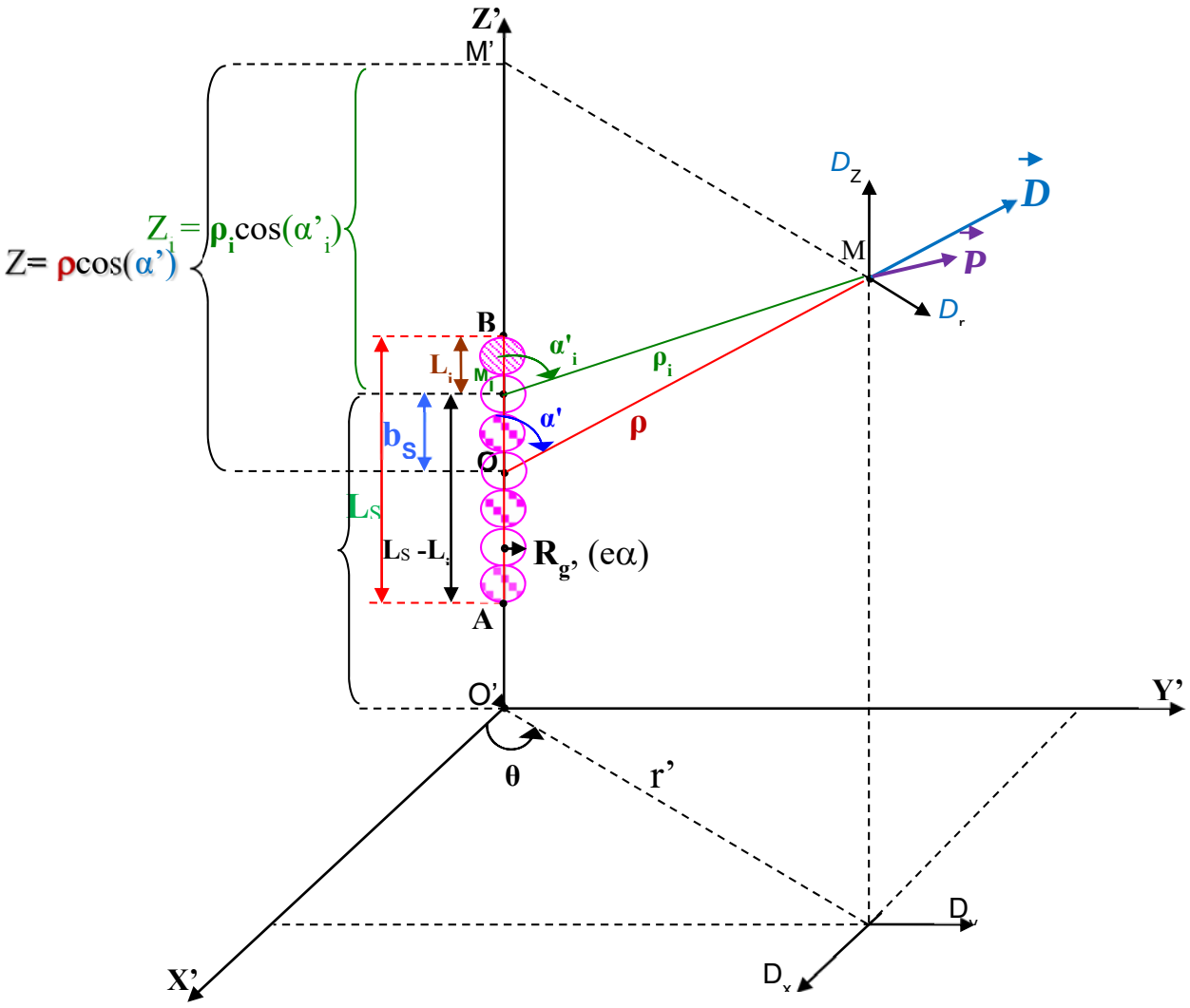
## GRAPHIC ABSTRACT

*Schematization of the dielectric friction phenomenon for a chain of successive charged spheres*



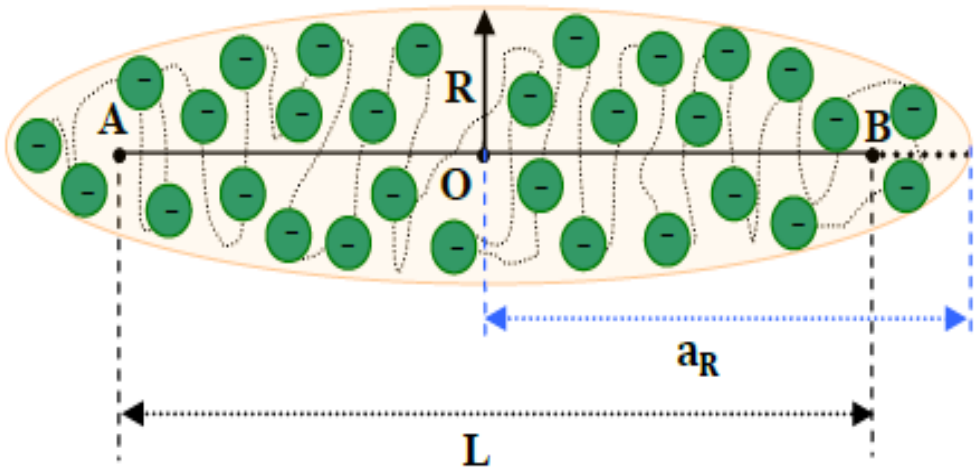



**Fig. 1.** Ellipsoidal representation of the conformation of a coiled polyion.

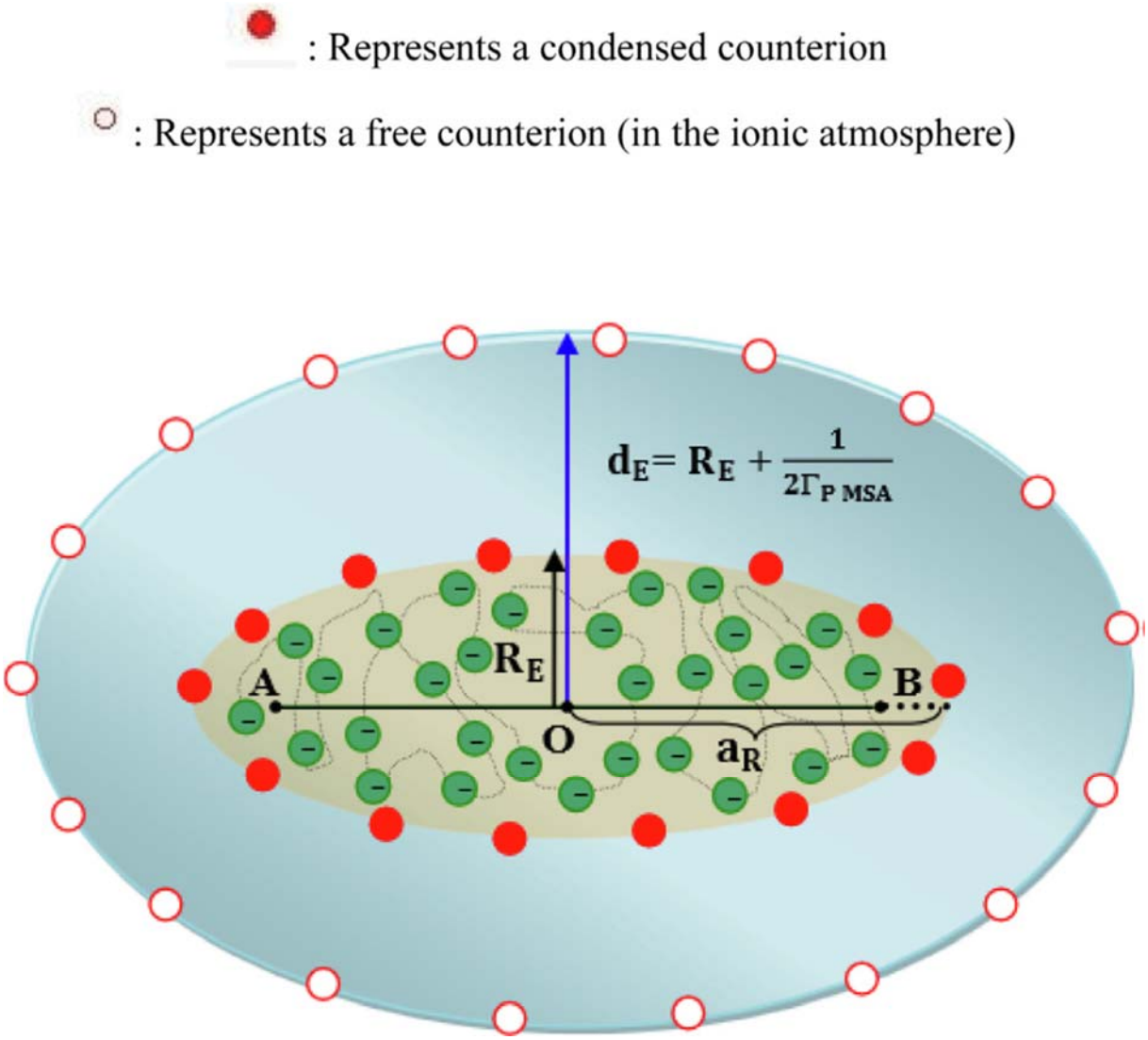



**Fig. 2.** Representation of an ellipsoidal polyion surrounded by its condensed couterions and its ionic atmosphere.

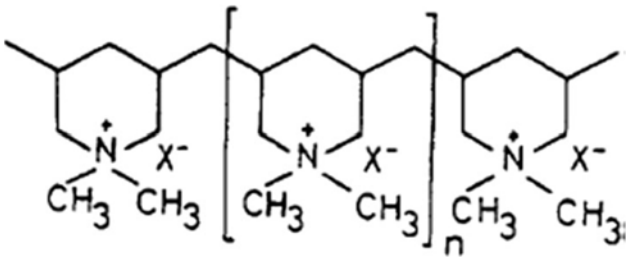


**Fig. 3** Expanded formula of poly(1,1-dimethyl-3,5-dimethylene piperidinium) $PDDP^{Z_S+}$ polyion chain.

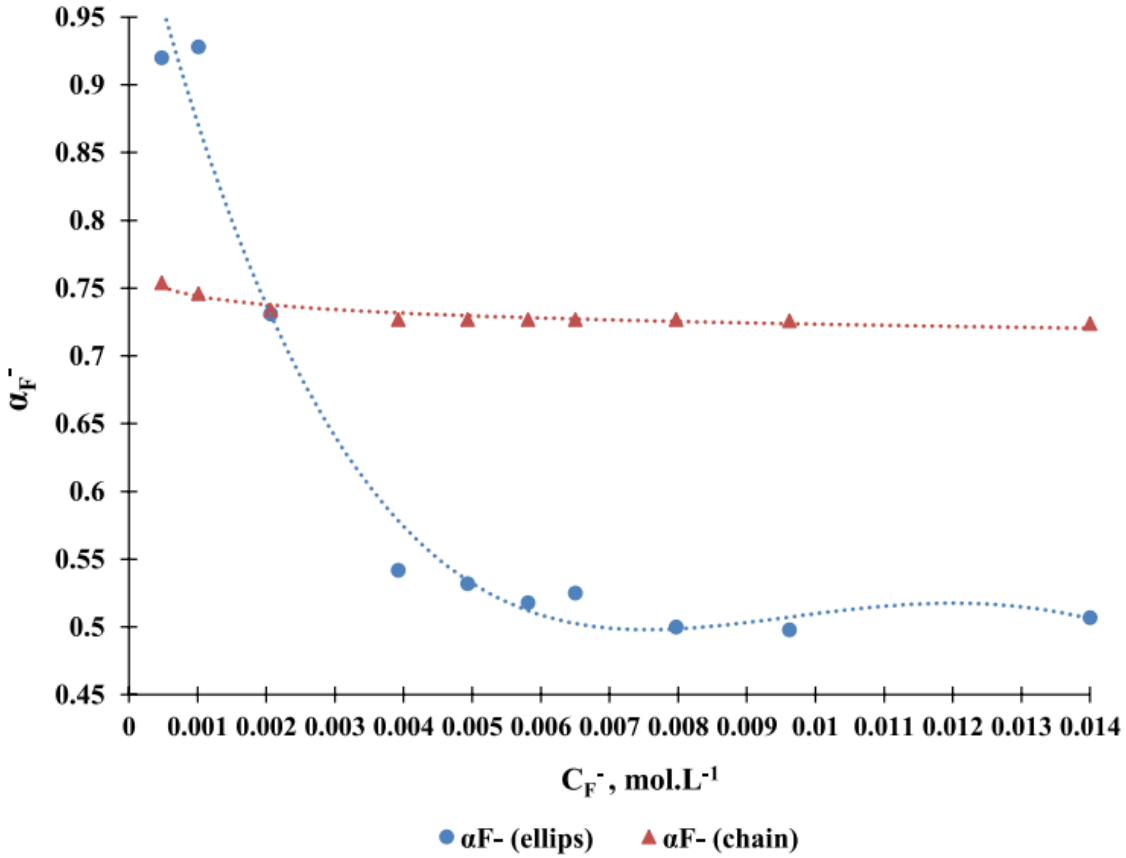



**Fig. 4** Comparison between the theoretical variations with the counter ion concentration $C_F^-$, of the degree of dissociation $\alpha_F^-$ in the case of ellipsoidal model and in the case of stretched chain model, for PDDPF polyelectrolytes in aqueous solution at 25 °C.

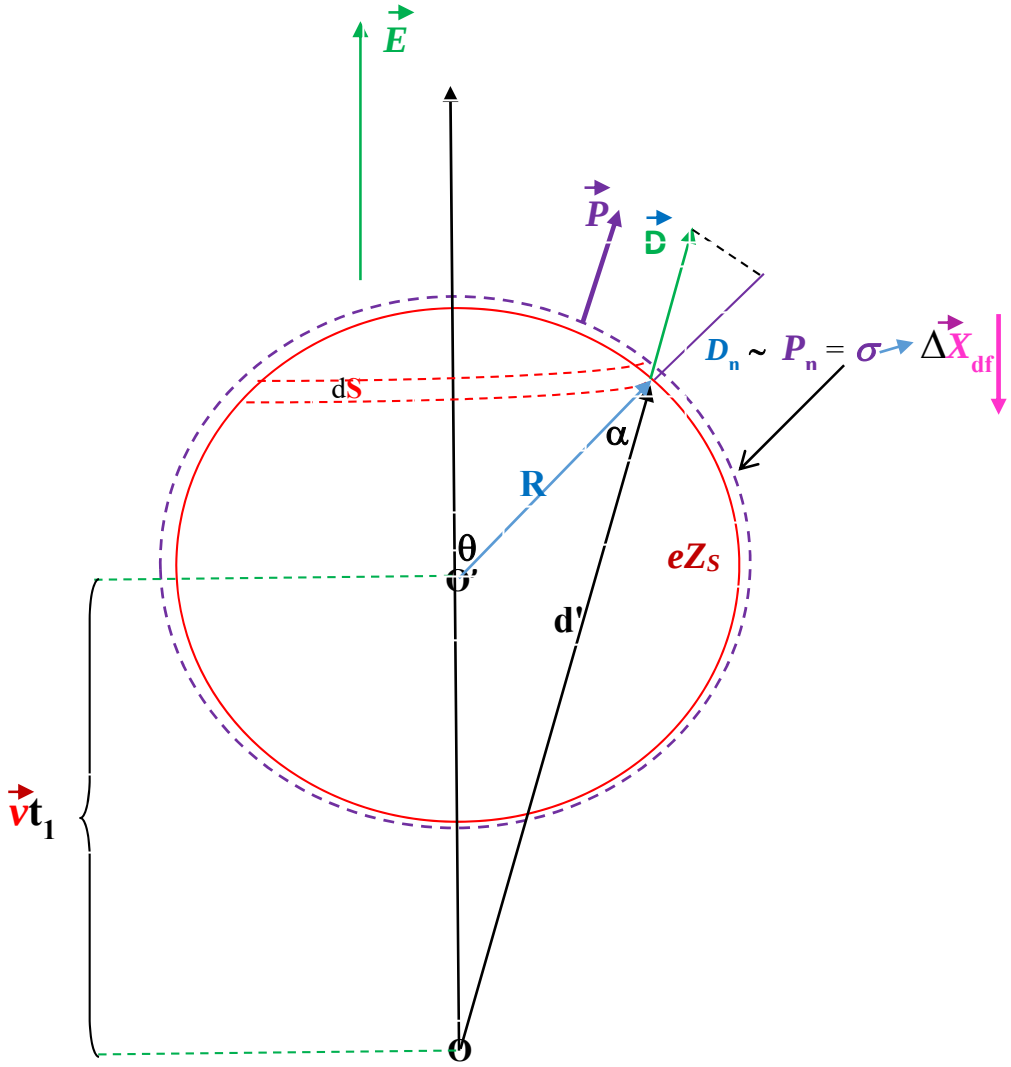



**Fig. 5** Heuristic schematization of the dielectric friction phenomenon for spherical moving charged particle.

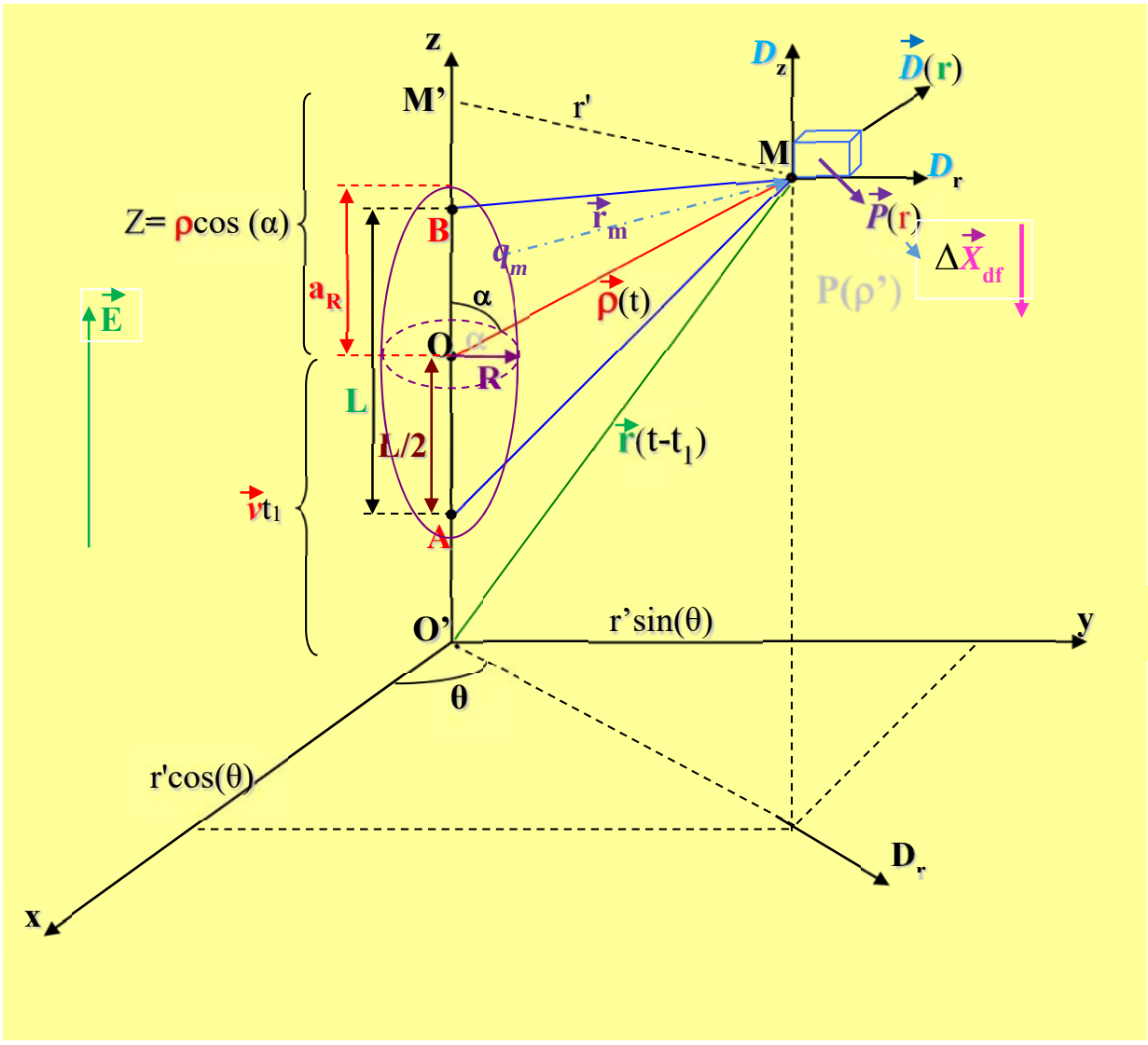



**Fig. 6** Schematization of the dielectric friction phenomenon for a non-spherical polyion.

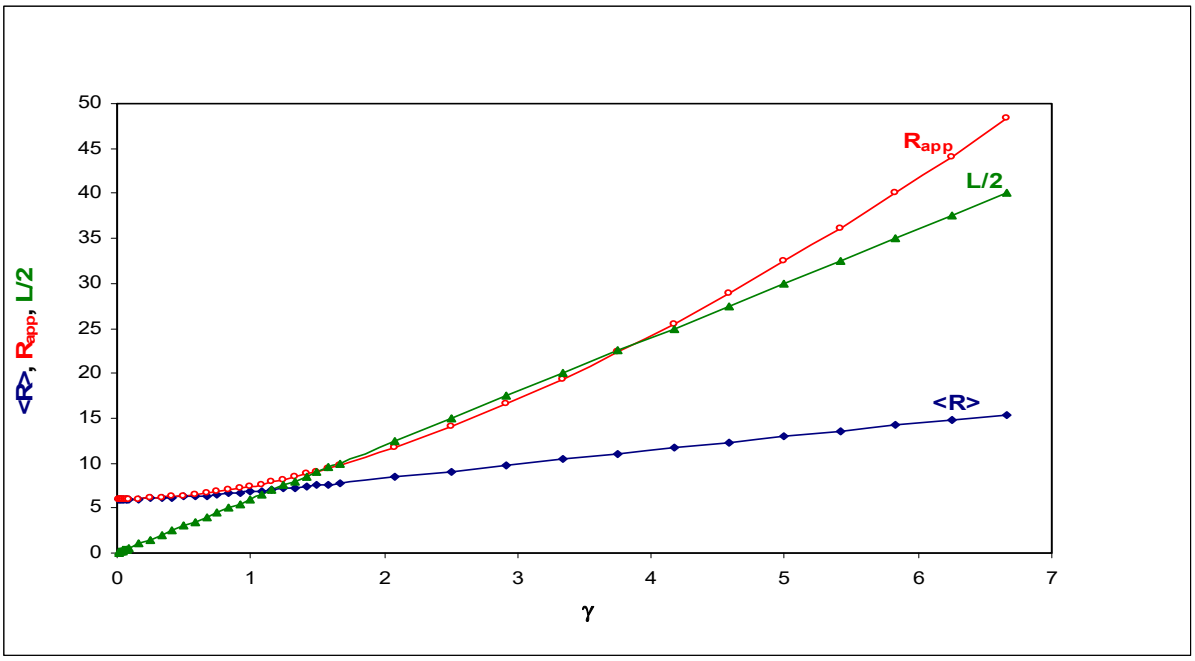



**Fig. 7** Comparison of the variations of the apparent radius $R_{app}$, the inter-focuses distance L and the mean radius <*R*> of an ellipsoidal polyion with its eccentricity $\gamma = L/2R$.

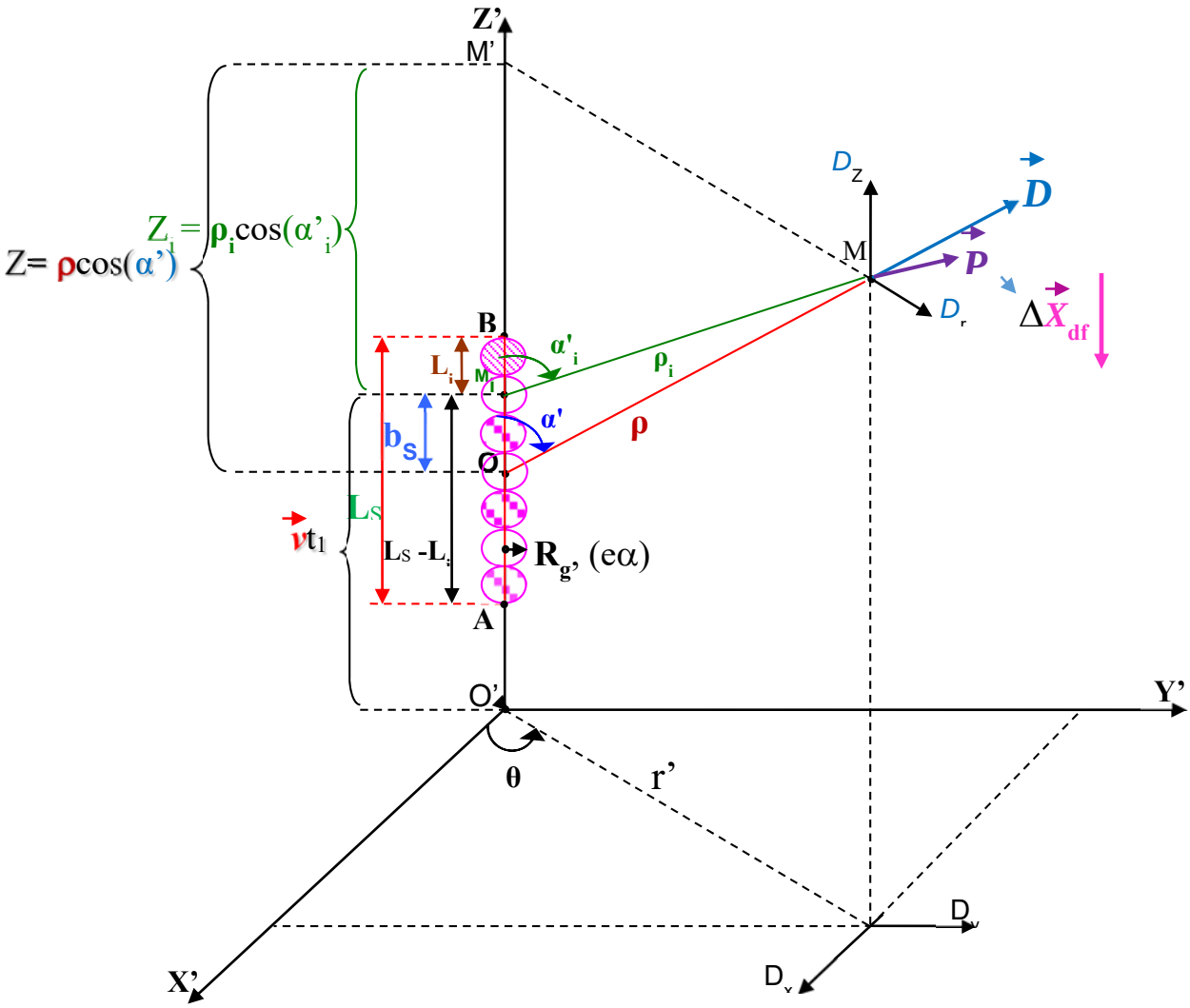



**Fig. 8** Schematization of the dielectric friction phenomenon for a chain of successive charged spheres.

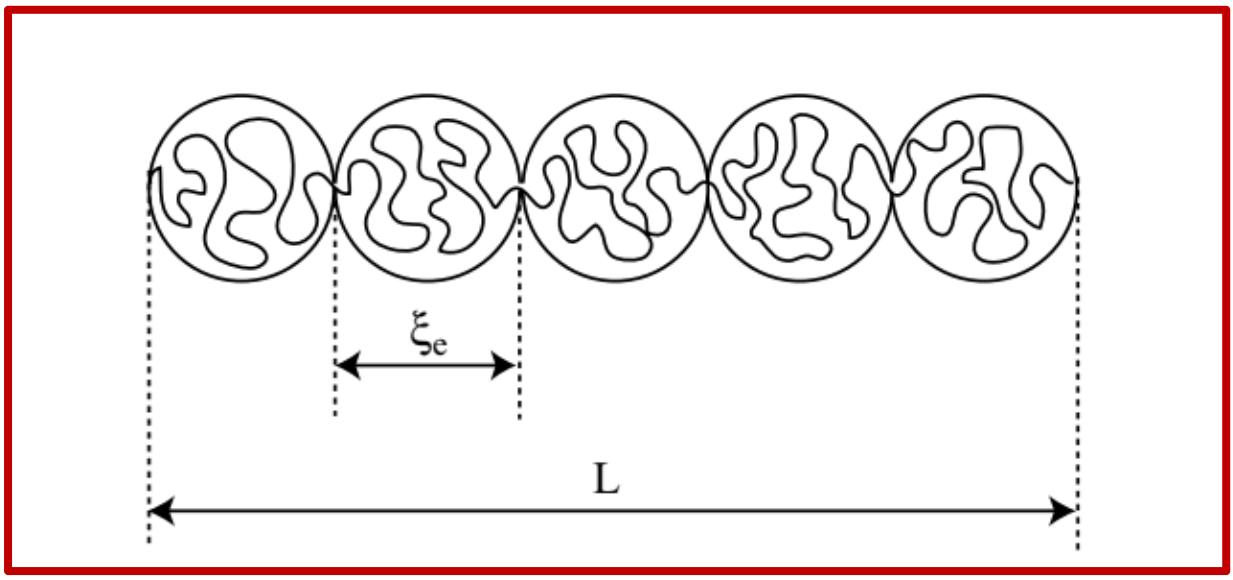



**Fig. 9.** Representation of a moving polyion as a chain of successive charged electrostatic blobs.

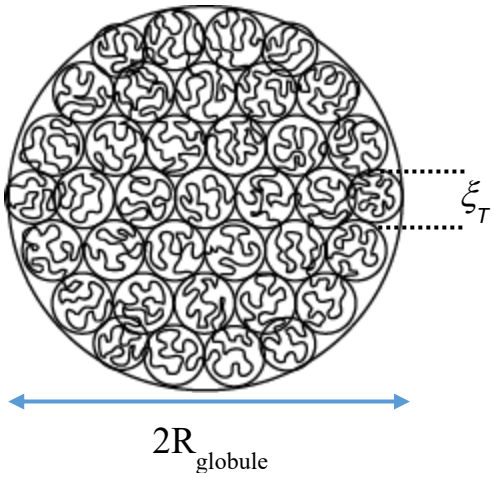



**Fig. 10** Globular hydrophobic Polymer represented as dense stack of Thermal Blobs of size $\xi_T$.

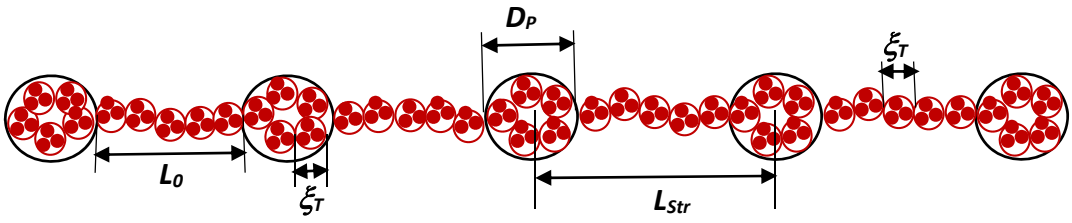



**Fig. 11** The "pearl necklace" conformation of a hydrophobic polyion chain.

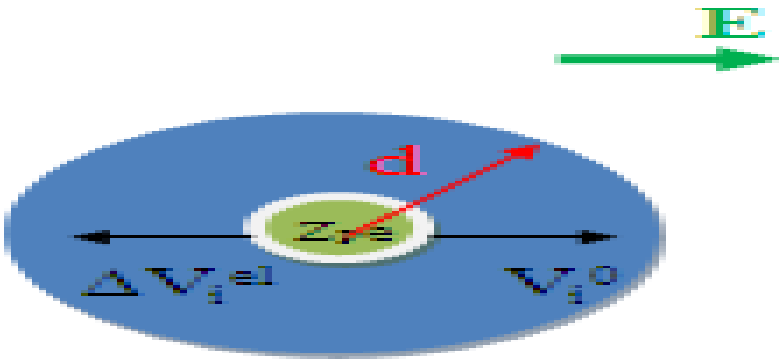



**Fig. 12** Schematization of the electrophoretic effect undergone by a moving polyion.

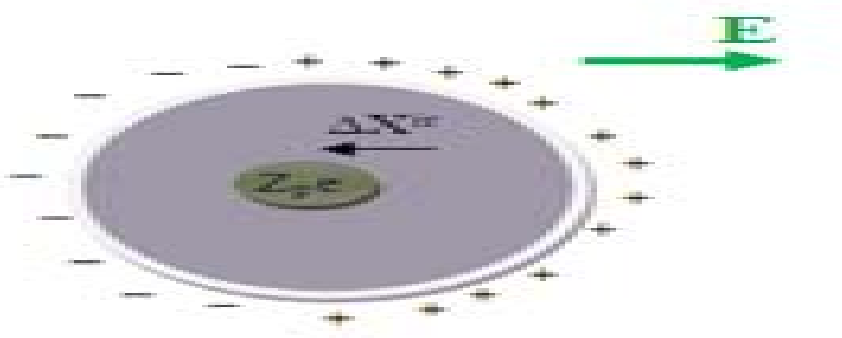


**Fig. 13** Schematization of the ionic relaxation friction undergone by a moving polyion.

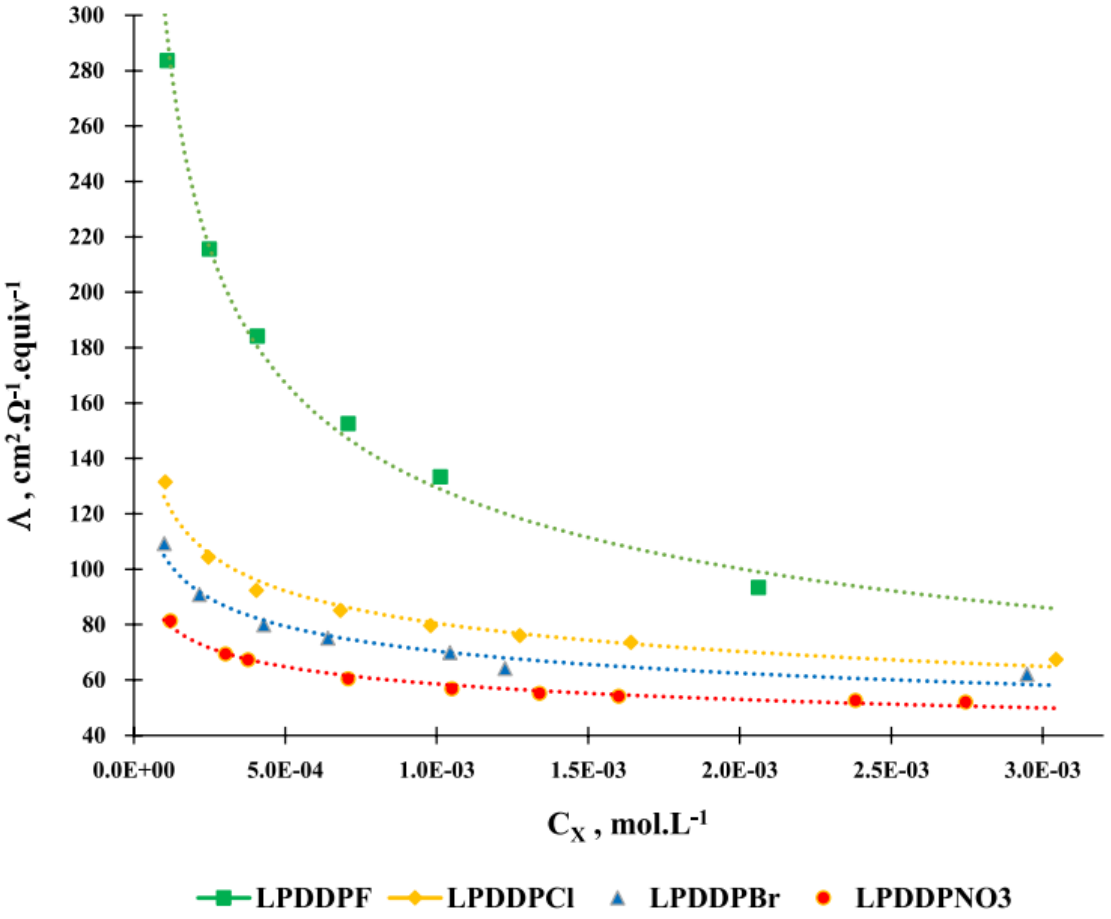



**Fig. 14** Variations with the ionic concentration $C_X$ of experimental equivalent conductivities: $\Lambda^{exp}_{PDDPF}$, $\Lambda^{exp}_{PDDPCl}$, $\Lambda^{exp}_{PDDPBr}$ and $\Lambda^{exp}_{PDDPNO3}$ , of PDDPX polyelectrolytes in water at 25°C.

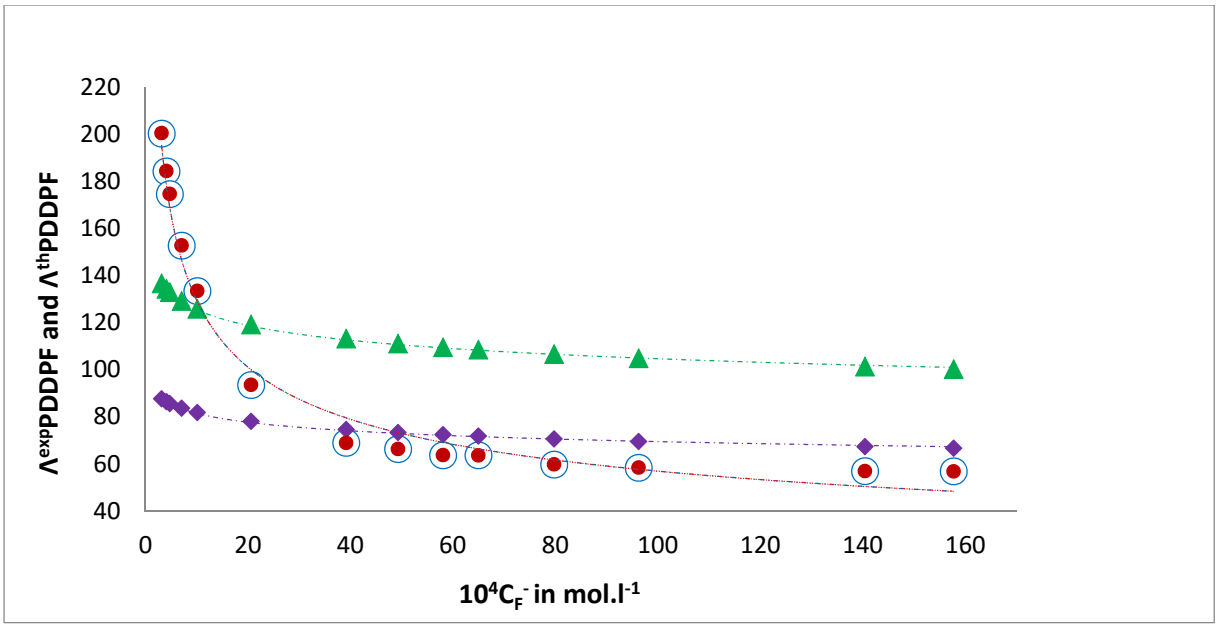



**Fig. 15** Comparison of the variations with concentration $C_F^-$ of the equivalent conductivities $\Lambda^{Manning,cor}_{PDDPF}$, $\Lambda^{Colby}_{PDDPF}$, $\Lambda^{exp}_{PDDPF}$, $\Lambda^{th}_{PDDPF}$, respectively of Manning, Colby, experimental, and ours theoretical Conductibility, of Fluoride poly(1,1-dimethyl-3,5-dimethylene piperidinium) PDDPF polyelectrolyte.

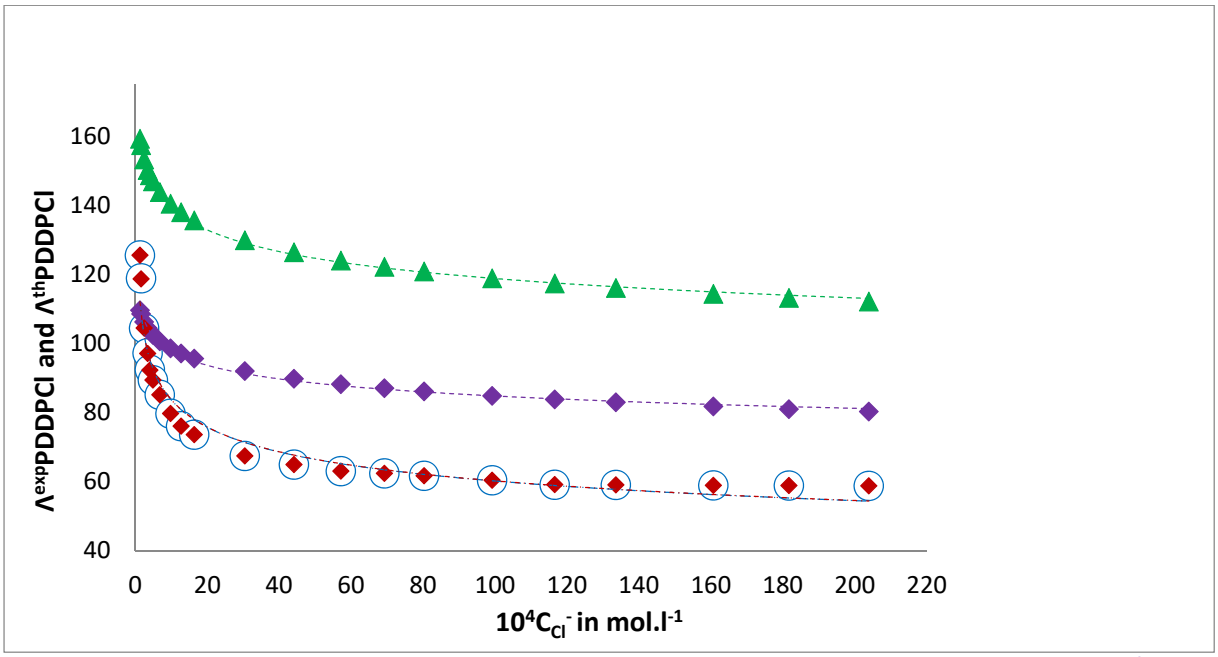



**Fig. 16** Comparison of the variations with concentration $C_{Cl^-}$ of the equivalent conductivities $\Lambda^{Manning,cor}_{PDDPCl}$, $\Lambda^{Colby}_{PDDPCl}$, $\Lambda^{exp}{}_{PDDPCl}$, $\Lambda^{th}{}_{PDDPCl}$, respectively of Manning, Colby, experimental, and ours theoretical Conductibility, of Chloride poly(1,1-dimethyl-3,5-dimethylene piperidinium) PDDPCl polyelectrolyte.

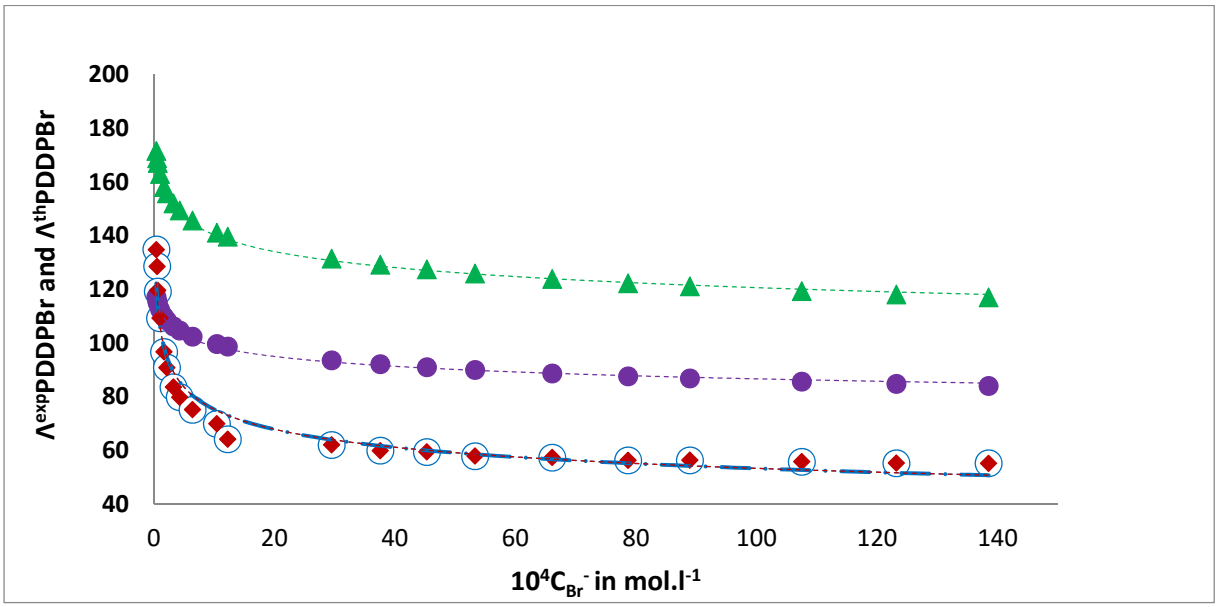



**Fig. 17** Comparison of the variations with concentration $C_{Br^-}$ of the equivalent conductivities $\Lambda^{Manning,cor}_{PDDPBr}$, $\Lambda^{Colby}_{PDDPBr}$, $\Lambda^{exp}{}_{PDDPBr}$, $\Lambda^{th}{}_{PDDPBr}$, respectively of Manning, Colby, experimental, and ours theoretical Conductibility, of Bromide poly(1,1-dimethyl-3,5-dimethylene piperidinium) PDDPBr polyelectrolyte.

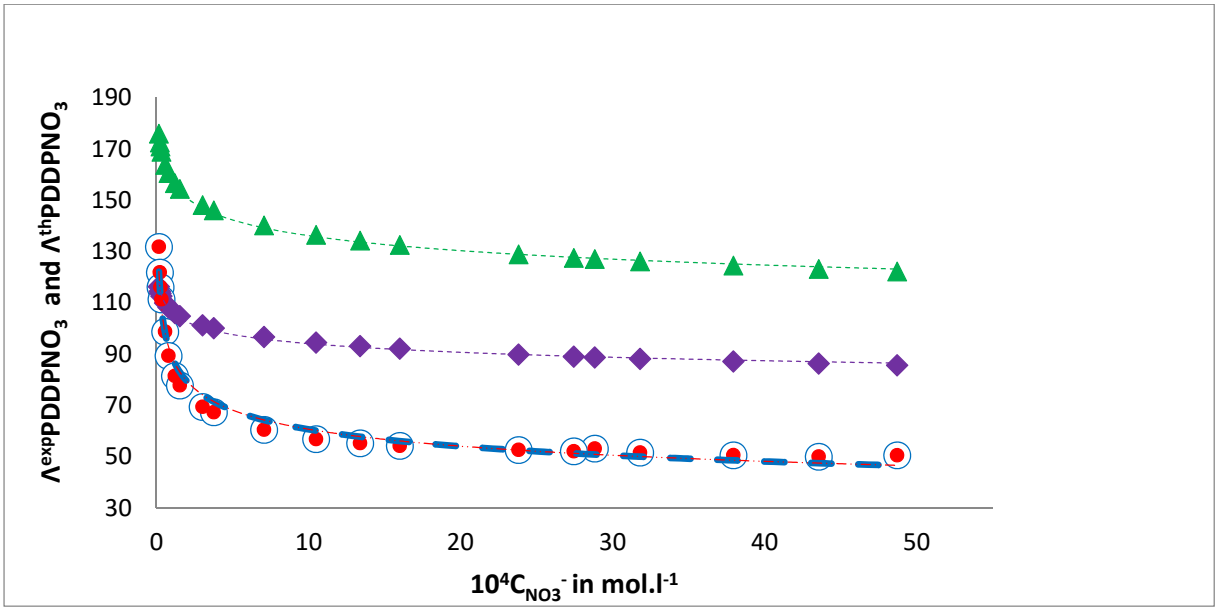



**Fig. 18** Comparison of the variations with concentration $C_{NO3^-}$ of the equivalent conductivities $\Lambda^{Manning,cor}_{PDDPNO3}$, $\Lambda^{Colby}_{PDDPNO3}$, $\Lambda^{exp}_{PDDPNO3}$, $\Lambda^{th}_{PDDPNO3}$, respectively of Manning, Colby, experimental, and ours theoretical Conductibility, of Nitrate poly(1,1-dimethyl-3,5-dimethylene piperidinium) $PDDPNO_3$ polyelectrolyte.