

# Biaxial ferromagnetic liquid crystal colloids

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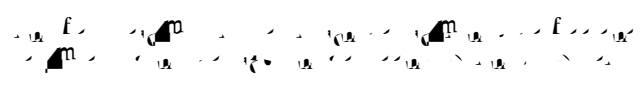
$\nabla^2 \phi = -\rho / \epsilon_0$   
 $\rho = \lambda \delta(r - R)$   
 $\phi(r) = \int \frac{\lambda \delta(r' - R)}{4\pi \epsilon_0 |r - r'|} dV'$   
 $\phi(r) = \frac{\lambda}{4\pi \epsilon_0} \int \frac{\delta(r' - R)}{|r - r'|} dV'$   
 $\phi(r) = \frac{\lambda}{4\pi \epsilon_0} \int \frac{\delta(r' - R)}{R} dV'$   
 $\phi(r) = \frac{\lambda}{4\pi \epsilon_0} \frac{1}{R} \int dV'$   
 $\phi(r) = \frac{\lambda}{4\pi \epsilon_0} \frac{1}{R} 4\pi R^2$   
 $\phi(r) = \frac{\lambda R}{\epsilon_0}$

$$U_{\text{elect}}(r_{\text{cc}}) = (A / r_{\text{cc}}) \exp(-r_{\text{cc}} / \lambda_D)$$

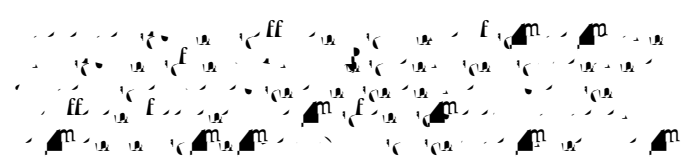
$\lambda_D = \sqrt{\epsilon_0 \epsilon_r k_B T / N_A e^2}$   
 $A = (Z^* e) \left( \frac{R}{\lambda_D} \right) / \left[ \epsilon_0 \epsilon_r \left( 1 + \frac{R}{\lambda_D} \right) \right]$   
 $Z^* \approx \frac{R}{\lambda_D}$   
 $A \approx \frac{R}{\lambda_D} \frac{R}{\lambda_D} / \left[ \epsilon_0 \epsilon_r \left( 1 + \frac{R}{\lambda_D} \right) \right]$   
 $A \approx \frac{R^2}{\lambda_D^2 \epsilon_0 \epsilon_r \left( 1 + \frac{R}{\lambda_D} \right)}$



...m...m...f...B...  
...m...m...f...  
...m...m...f...  
...m...m...f...



$$F_{\text{coupl}} = \int (\mu_0 \theta_m - \mu_0 \theta_{me}) dV \approx \mu_0 (\theta_{me}) \int (\theta_m - \theta_{me}) dV.$$





I-K  $\theta_{me}$  f  
A B  
C-E