

$$E_N = E_g \frac{\rho_f^2 \phi^{5/3} + \rho_m^2 (1 - \phi^{5/3}) + 5/2 (\rho_f - \rho_m) \rho_m \phi (1 - \phi^{2/3}) - \bar{\rho}^2}{\bar{\rho}^2}$$