Quiz: Lecture 2.9
Principles of Electronic Nanobiosensors
Muhammad A. Alam, nanoHUB-U Fall 2013

Answer the f**ive questions** below by choosing the **one, best answer**.

1) The diffusion equivalent capacitance needed to calculate the MFPT and NET are

a) Exactly the same.
b) Involve different geometric configurations of the 'electrodes'.
c) Involve different dielectric constants.
d) None of the above.

2) The factor μ of the diffusion equivalent capacitance for the 2D NET problem can be calculated provided we know

a) The size of the exit disk.
b) The size of the exist disk and the initial position of the biomolecule.
c) The diffusion coefficient of the biomolecule.
d) The volume of the cell.

3) It has been mentioned that the equation $(\rho_0 \times t_s^{\frac{3-D_F}{2}} \sim c)$ is analogous to the Uncertainty principle. The analogy is very crude, because

a) The diffusion limit can be overcome by various techniques.
b) The constant c depends on the parameters of the sensor.
c) The diffusion constraint takes this simplified form only for sensor defined by time-independent fractal dimension.
d) All of the above.

4) Measurement of responses of a few sensors

a) MFPT, NET, and the sensor response time are all defined by geometry of diffusion.
b) The MFPT and NET define almost similar physical problem, with slight difference.
c) NET is always larger than MFPT.
d) All of the above.

5) We have used the concept of diffusion equivalent capacitance to solve three very different problems. These problems are

a) Droplet evaporation, settling time, charge of the biomolecule.
b) Size of the DNA polymers, selectivity of biosensors, DNA evaporation.
c) Settling time, Narrow escape time, Peclet number.
d) Settling time, Droplet evaporation, MFPT.

End of quiz. This quiz contains 5 questions.