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Supplemental Information

A Model for the Transient Subdiffusive Behavior of Particles in Mucus

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```
%% Input
L = 500e-9; % distance between permeable membranes in m
R = 100e-9; % particle radius in m
N = 10000; % number of time steps / iterations
M = 10000; % number of particles
T = 10; % total time in s
ts = T/N; % time step in s
time = ts*(0:N-1); % time in s
pM = 0.5; % permeation parameter in 1/sqrt(s)
r = 1 - pM*sqrt(ts); % reflection probability
V = 0.004; % dynamic viscosity in Pa*s
kb = 1.38e-23; % Boltzmann constant in J/K
Temp = 310.15; % absolute temperature in K
D0 = (kb*Temp)/(6*pi*V*R); % diffusion coefficient (Stokes-Einstein) in m²/s

%% simulation
x_0 = repmat(L*rand(M,1),1,N);
dx = sqrt(2*D0*ts);
xpos = x_0;
for m = 1:M
   for n = 1:N-1
      step = dx*randn;
      xpos(m,n+1) = xpos(m,n) + step;
      if mod(xpos(m,n),L) + step > L && rand < r
         xpos(m,n+1) = xpos(m,n) - step + 2*L - 2*mod(xpos(m,n),L);
      elseif mod(xpos(m,n),L) + step < 0 && rand < r
         xpos(m,n+1) = xpos(m,n) - step - 2*mod(xpos(m,n),L);
      end
```

```
    end
end
msd = mean((xpos-x_0).^2,1); % mean squared displacement in m
Deff = msd(end)/(2*T); % effective diffusion coefficient in m²/s

%% Output
% Create figure
figure1 = figure;

% Create axes
axes1 = axes('Parent',figure1,'YScale','log','YMinorTick','on',...
    'XScale','log',...
    'XMinorTick','on');
box(axes1,'on');
hold(axes1,'all');

% Create multiple lines using matrix input to loglog
loglog1 = loglog(time,[msd;2*D0*time;2*Deff*time],'Parent',axes1);
set(loglog1(1),...
    'DisplayName','normal diffusion with D0 and effective diffusion coefficient (r > 0)');
set(loglog1(2),'DisplayName','normal diffusion with D0 and r = 0');
set(loglog1(3),'DisplayName','normal diffusion with Deff');

% Create xlabel
xlabel('time [s]');

% Create ylabel
ylabel('MSD [m²]');
```

```
% Create legend

legend(axes1,'show','Location','NW');
```