

```
1. clear; clc;
2.
3. e = 1.6e-19; eVtoJ = e; JtoEv = e^(-1);
4. me = 9.11*1e-31; nm = 1e-9;
5.
6. T = 360; % K
7.
8. checkTime = 0:1:10; %years
9.
10. % atoms' radius
11. dx = 0.56; %nm
12. % Smooth
13. % dx = 0.3; %nm
14.
15. % Count layers
16. % Active field
17. a = 8; % monolayers
18. b = 5;
19. c = 6;
20.
21. sizeHS = a + b + c + b + a;
22.
23. % Smooth
24. % a = a*2; % monolayers
25. % b = b*2;
26. % c = c*2;
27.
28. % Fermi Energy
29. EFermi = 1.51*1e-20; % J
30.
31. % Applyied voltage
32. dU = 0:0.01:0.5;
33.
34. % grid of Al conentration
35. grid_x_Al = [zeros(1, a), ...
36.     0.44*ones(1, b), ...
37.     zeros(1, c), ...
38.     0.44*ones(1, b), ...
39.     zeros(1, a)
40. ];
41.
42. % Get profile Ec
43. % [grids_Ec, grids_meff, grids_C_Al] = getDiffCloseAlGaAs( grid_x_Al, checkTime, dx*nm, T );
44. % [grids_Ec, grids_meff, grids_C_Al] = getDiffOpenAlGaAs( grid_x_Al, checkTime, dx*nm, T );
45. % [grids_Ec, grids_meff, grids_C_Al] = getDiffCloseAlGaAsNd( grid_x_Al, checkTime, dx*nm, T, 5e15*1e6 );
46. % [grids_Ec, grids_meff, grids_C_Al] = getDiffOpenAlGaAsNd( grid_x_Al, checkTime, dx*nm, T, 5e15*1e6 );
47. [grids_Ec, grids_meff, grids_C_Al, Six] = getDiffAlGaAs_Si( grid_x_Al, checkTime, dx*nm, T, 2*1e18*1e6
48. );
49.
50. % get J from V
51. for j = 1 : length(checkTime)
52.     J(j, :) = getJ(dx*nm, ...
53.         grids_meff(j, :)*me, ...
54.         grids_Ec(j, :)*eVtoJ, ...
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54.         dU*eVtoJ, ...
55.         EFermi...
56.     );
57. end
58.
59. figure('units', 'normalized', 'outerposition', [0 0 1 1]);
60. Axes = {
61.     subplot(1, 2, 1);
62.     subplot(1, 2, 2);
63. };
64.
65. plot(Axes{1}, (0:a+b+c+b+a-1)*dx, grids_C_A1);
66. plotFormat( Axes{1}, ...
67.     strcat('Part of Aluminum, then $T=', num2str(T), 'K$') , ...
68.     'z, $nm$', 'x, part of Al', ...
69.     strread(num2str(checkTime), '%s'), ...
70.     [0, (a+b+c+b+a-1)*dx], [], ...
71.     16 ...
72. );
73.
74. plot(Axes{2}, (0:a+b+c+b+a-1)*dx, grids_Ec);
75. plotFormat( Axes{2}, ...
76.     strcat('Part of Aluminum, then $T=', num2str(T), 'K$'), ...
77.     'z, $nm$', 'x, part of Al', ...
78.     strread(num2str(checkTime), '%s'), ...
79.     [0, (a+b+c+b+a-1)*dx], [], ...
80.     16 ...
81. );
82.
83. figure('units', 'normalized', 'outerposition', [0 0 1 1]);
84. Axes = {
85.     subplot(1, 2, 1);
86.     subplot(1, 2, 2);
87. };
88.
89. plot(Axes{1}, dU, [J(1, :); J(2, :)]);
90. plotFormat( Axes{1}, ...
91.     strcat('Current density, then $T=', num2str(T), 'K$'), ...
92.     'U, $V$', 'J, $A/m^{2}$', ...
93.     strread(num2str(checkTime(1:2)), '%s'), ...
94.     [], [0, max(max(J(1:2, :)))], ...
95.     16 ...
96. );
97.
98. plot(Axes{2}, dU, J);
99. plotFormat( Axes{2}, ...
100.     strcat('Current density, then $T=', num2str(T), 'K$'), ...
101.     'U, $V$', 'J, $A/m^{2}$', ...
102.     strread(num2str(checkTime), '%s'), ...
103.     [], [0, max(max(J))], ...
104.     16 ...
105. );
```