

1 Start coding or generate with AI.

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✓ Silicon bandgap as a function of temperature

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Goal

Plot the $E_g(T)$ of silicon between 0 to 800 K using the following equation:

$$E_g(T) = 1.17 - \frac{(4.73 \times 10^{-4})T^2}{T + 636}$$

Double-click (or enter) to edit

```
1 ## Import libraries
2
3 import numpy as np
4 import matplotlib.pyplot as plt

1 ## Define constants
2
3 E0 = 1.17 # [eV] bandgap at 0 K
4

1 ## Define the x-vector
2
3 T = np.linspace(0,800,25)
```

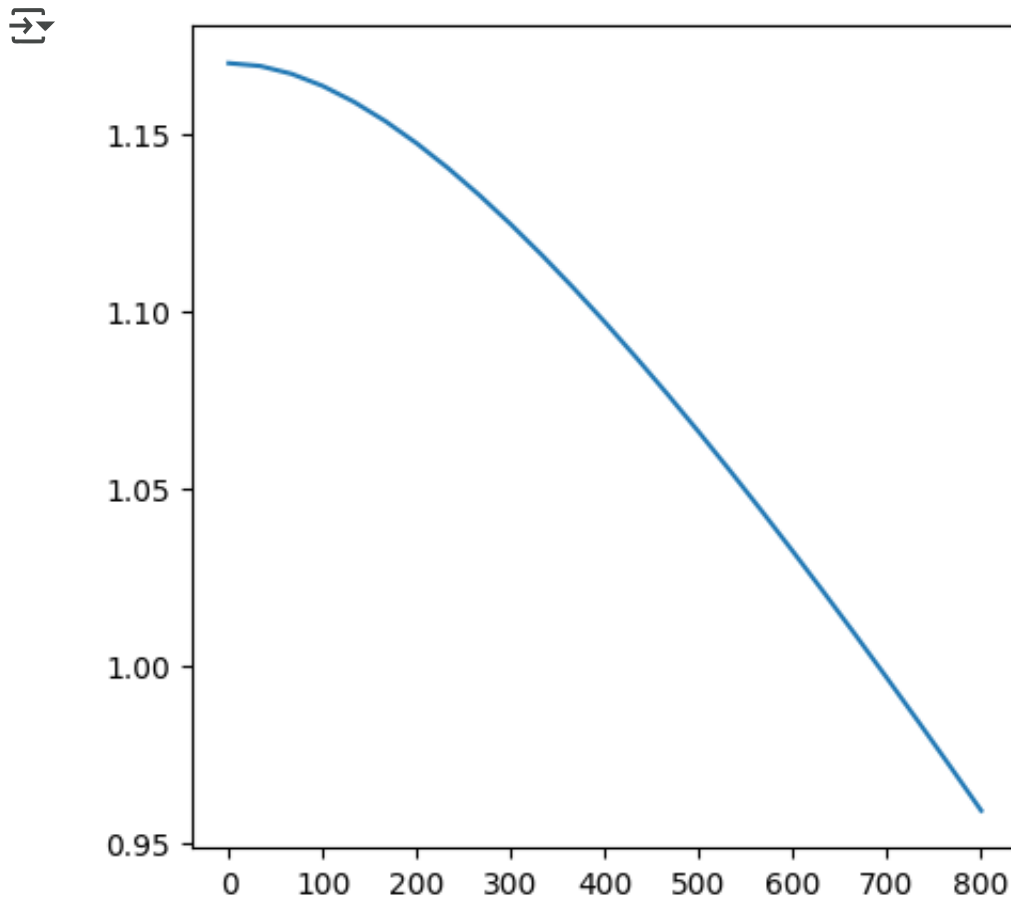
```
1 ## Declare the functions
2
3 Eg_T_Si = Eo - (4.73e-4*T**2)/(T+636)
4 Eg_300_Si = Eo - (4.73e-4*300**2)/(300+636)
5
6 round(Eg_300_Si,2)
```

→ 1.12

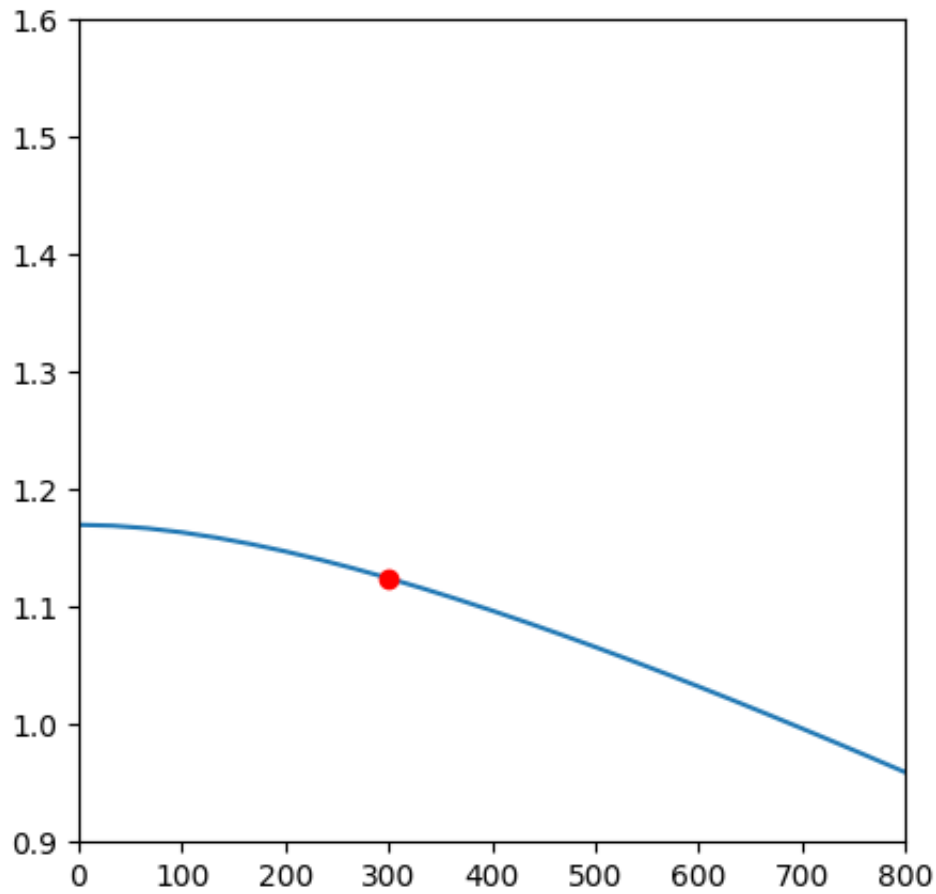
```
1 ## Plot the Eg(t) function
2
3 plt.figure(figsize=(5,5))
4 plt.show()
```

→ <Figure size 500x500 with 0 Axes>

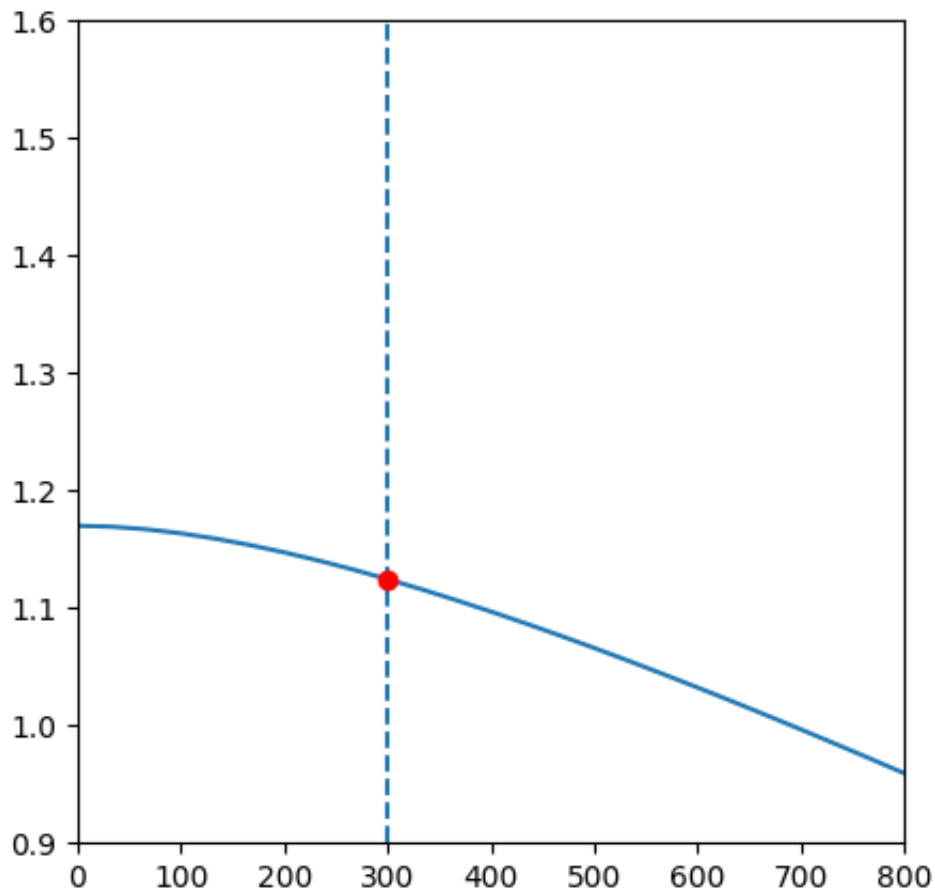
```
1 ## Plot the Eg(t) function
2
3 plt.figure(figsize=(5,5))
4 plt.plot(T, Eg_T_Si)
5 plt.show()
```



```
1 ## Plot the Eg(t) function
2
3 plt.figure(figsize=(5,5))
4 plt.plot(T, Eg_T_Si)
5 plt.plot(300, Eg_300_Si, 'ro')
6
7 plt.xlim(0,800)
8 plt.ylim(0.9,1.6)
9
10 plt.show()
```



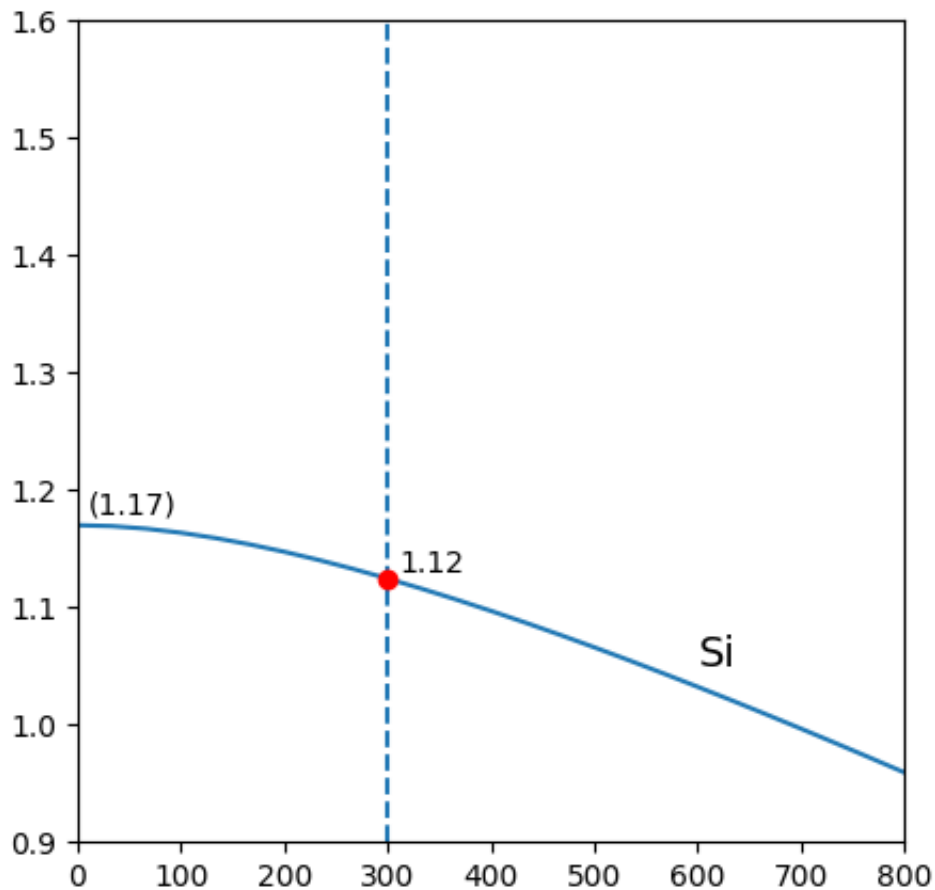
```
1 ## Plot the Eg(t) function
2
3 plt.figure(figsize=(5,5))
4
5 plt.vlines(300, 0.9, 1.6, linestyle = 'dashed')
6
7 plt.plot(T, Eg_T_Si)
8 plt.plot(300, Eg_300_Si, 'ro')
9
10
11 plt.xlim(0,800)
12 plt.ylim(0.9,1.6)
13
14 plt.show()
```



```

1 ## Plot the Eg(t) function
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3 plt.figure(figsize=(5,5))
4
5 plt.vlines(300, 0.9, 1.6, linestyle = 'dashed')
6
7 plt.plot(T, Eg_T_Si)
8 plt.plot(300, Eg_300_Si, 'ro')
9
10 plt.text(10, 1.18, "(1.17)" )
11 plt.text(310, 1.13, f"{round(Eg_300_Si,2)}" )
12 plt.text(600, 1.05, "Si", fontsize = 14)
13
14
15 plt.xlim(0,800)
16 plt.ylim(0.9,1.6)
17
18 plt.show()

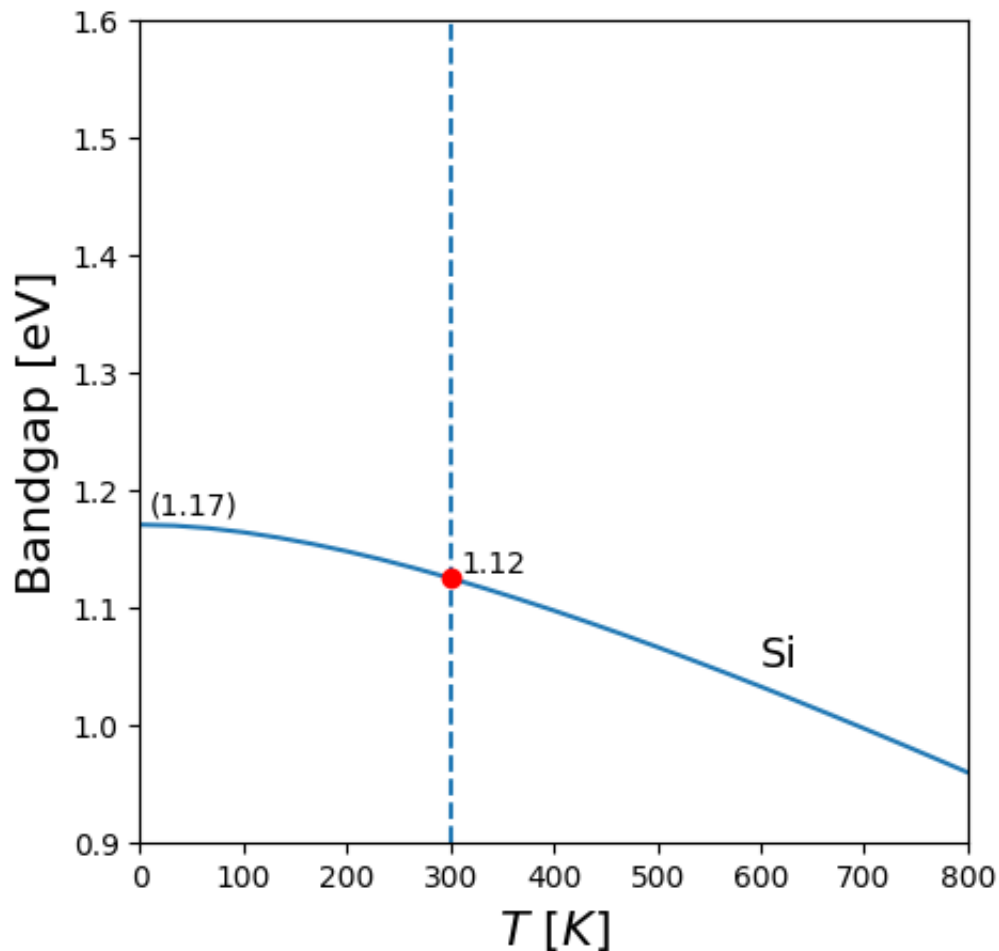
```



```

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9
10 plt.text(10, 1.18, "(1.17)" )
11 plt.text(310, 1.13, f"{round(Eg_300_Si,2)}" )
12 plt.text(600, 1.05, "Si", fontsize = 14)
13
14 plt.xlabel("$T \, \text{[K]}$", fontsize = 16 )
15 plt.ylabel("Bandgap [eV]", fontsize = 16 )
16
17
18 plt.xlim(0,800)
19 plt.ylim(0.9,1.6)
20
21 plt.show()

```



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