In [1]:

```python
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:

```python
def get_intensity(N, lam, d, n_0, n_e):
    fi = 2. * np.pi * d * (n_0 - n_e)

    lam = np.array(lam)/np.power(10, 9)
    intensity = np.zeros_like(lam)

    for i in xrange(lam.size):
        fi /= lam[i]
        intensity[i] = np.power(np.sin(fi * np.power(2, N - 1))/ (np.sin(fi/2.
        fi *= lam[i]

    return intensity
```

In [3]:

```python
def plot_graphic(N, d, n_0, n_e, lam_min = 0, lam_max = 0, y_max = 0):

    plt.figure(figsize=(16, 5))

    if lam_max != 0:
        n = np.arange(lam_min, lam_max, (lam_max - lam_min) / 1000.)
    else:
        n = np.arange(0., 1000., 0.05)
    plt.plot(n,  get_intensity(N, n, d, n_0, n_e), label='Intensity')

    if lam_max != 0:
        plt.xlim((lam_min, lam_max))

    if y_max != 0:
        plt.ylim((0, y_max))

    plt.xlabel('$\\lambda$, nm')
    plt.title('$N = ' + str(N) + ', d_{1} = ' + str(d) + ', n_{0} = ' + str(n_
    plt.grid()
    plt.legend()
    plt.show()
```
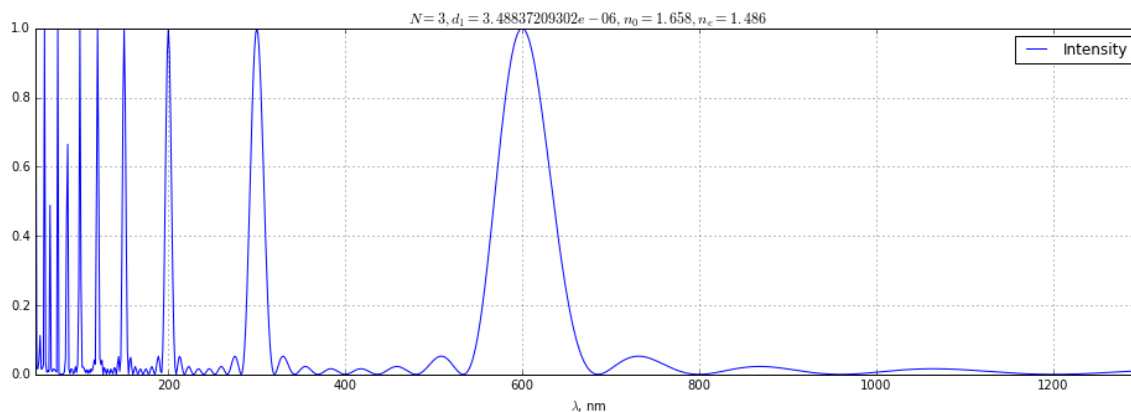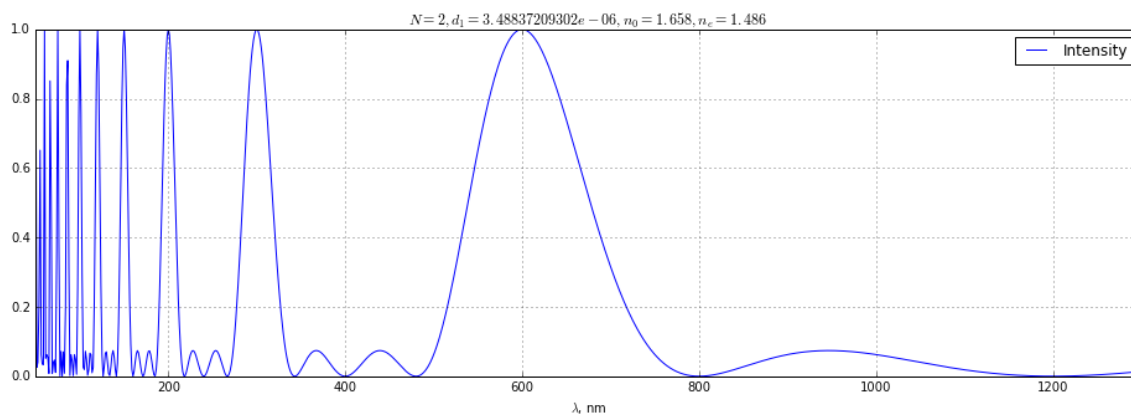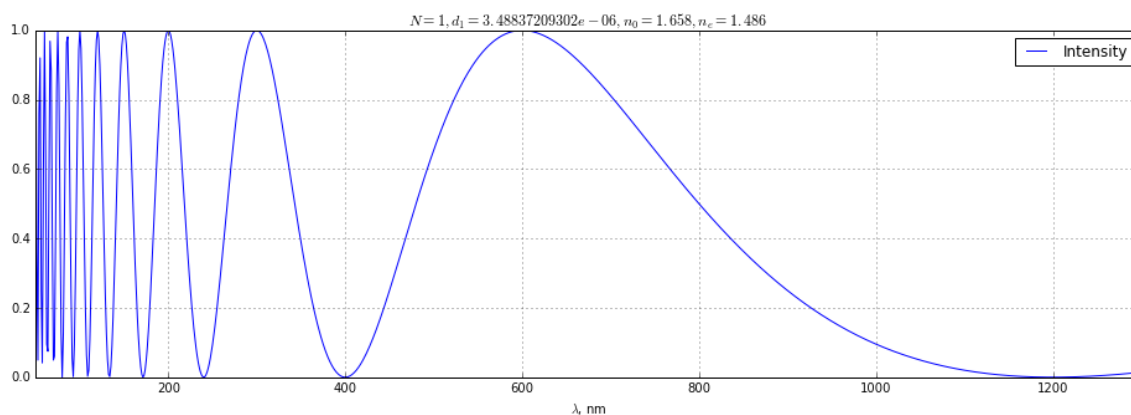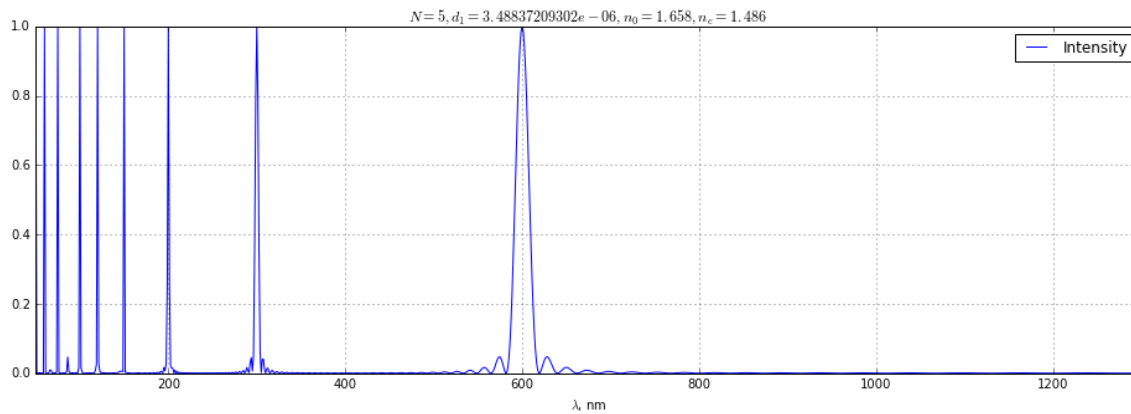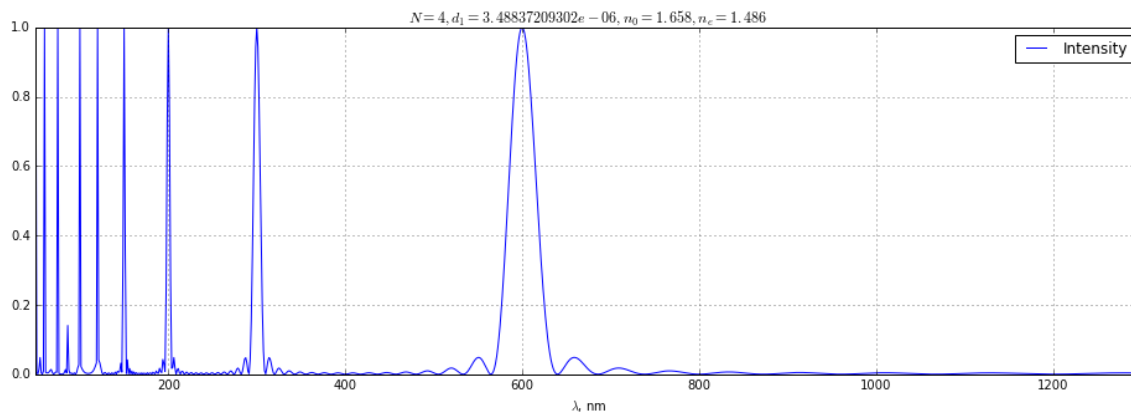
In [4]:

```python
lam = 600.
n_0 = 1.658
n_e = 1.486
d = lam * np.power(10., -9) / (n_0 - n_e)
lam_min = 50
lam_max = 1300
y_max = 0
plot_graphic(1, d, n_0, n_e, lam_min, lam_max, y_max)
plot_graphic(2, d, n_0, n_e, lam_min, lam_max, y_max)
plot_graphic(3, d, n_0, n_e, lam_min, lam_max, y_max)
plot_graphic(4, d, n_0, n_e, lam_min, lam_max, y_max)
plot_graphic(5, d, n_0, n_e, lam_min, lam_max, y_max)
```
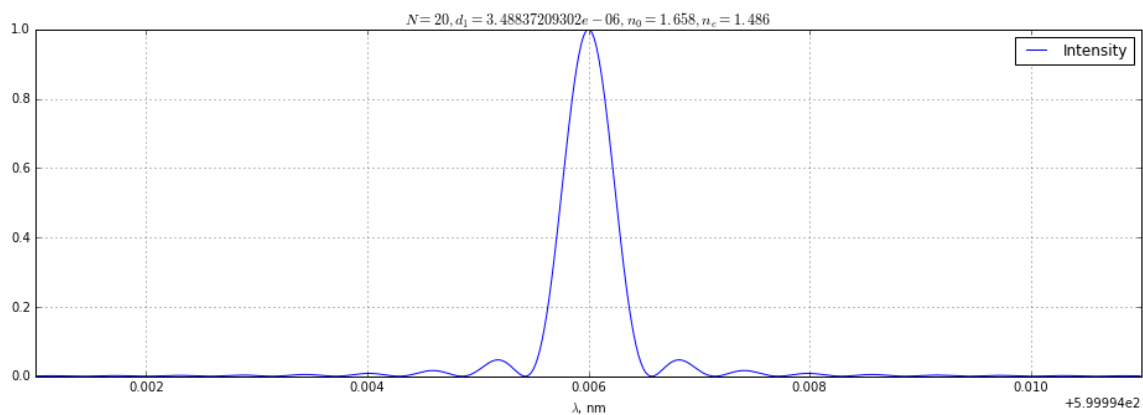
$N = 1, d_1 = 3.48837209302e - 06, n_0 = 1.658, n_e = 1.486$

$N = 2, d_1 = 3.48837209302e - 06, n_0 = 1.658, n_e = 1.486$

$N = 3, d_1 = 3.48837209302e - 06, n_0 = 1.658, n_e = 1.486$

$N=4, d_1=3.48837209302e-06, n_0=1.658, n_e=1.486$

$N=5, d_1=3.48837209302e-06, n_0=1.658, n_e=1.486$

In [5]:

```
plot_graphic(20, d, n_0, n_e, lam - 0.005, lam + 0.005, y_max)
print lam
```

$N=20, d_1=3.48837209302e-06, n_0=1.658, n_e=1.486$

600.0

In [6]:

```
plot_graphic(20, d, n_0, n_e, lam / 2 - 0.005, lam / 2 + 0.005, y_max)
print lam/2
```


$N = 20, d_1 = 3.48837209302e - 06, n_0 = 1.658, n_c = 1.486$
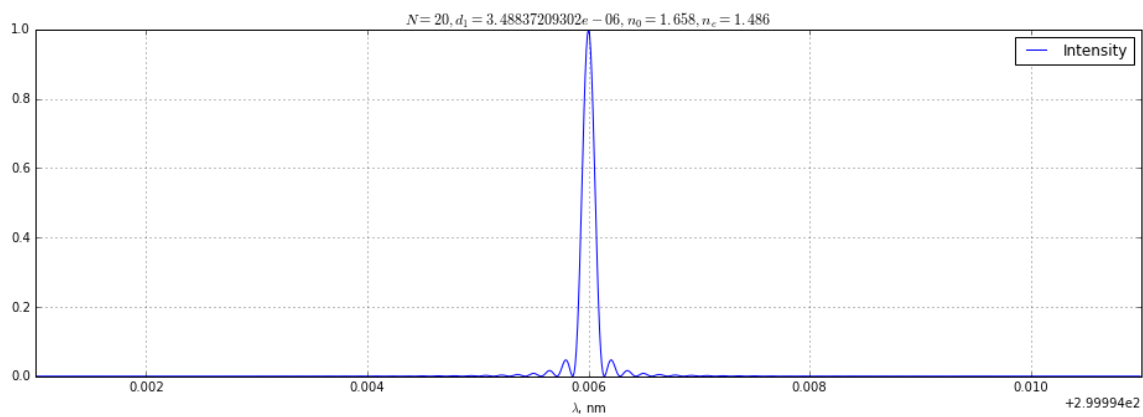
300.0

In [7]:

```
plot_graphic(20, d, n_0, n_e, lam / 3 - 0.005, lam / 3 + 0.005, y_max)
print lam/3
```


$N = 20, d_1 = 3.48837209302e - 06, n_0 = 1.658, n_c = 1.486$

200.0