1st German-Arab Young Scientists Forum

June 17-19, 2011

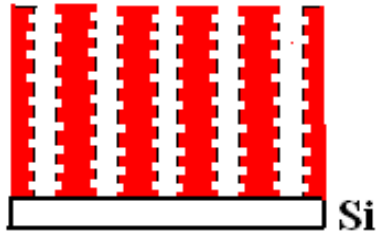# Synthesis of Silicon-Based Photonics and One-Dimensional Nanostructures for Various Applications
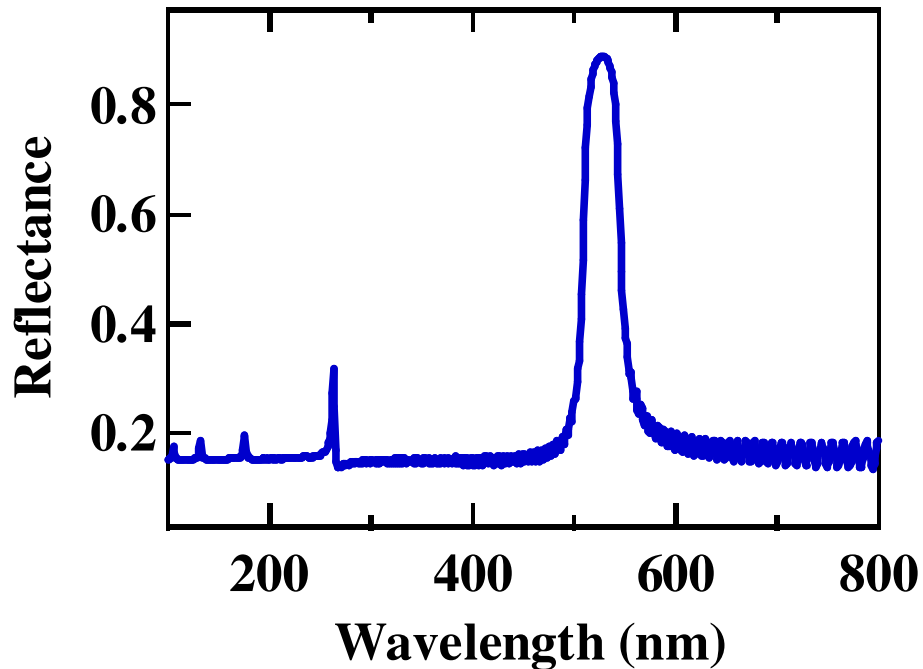
Mohamed Shaker Salem
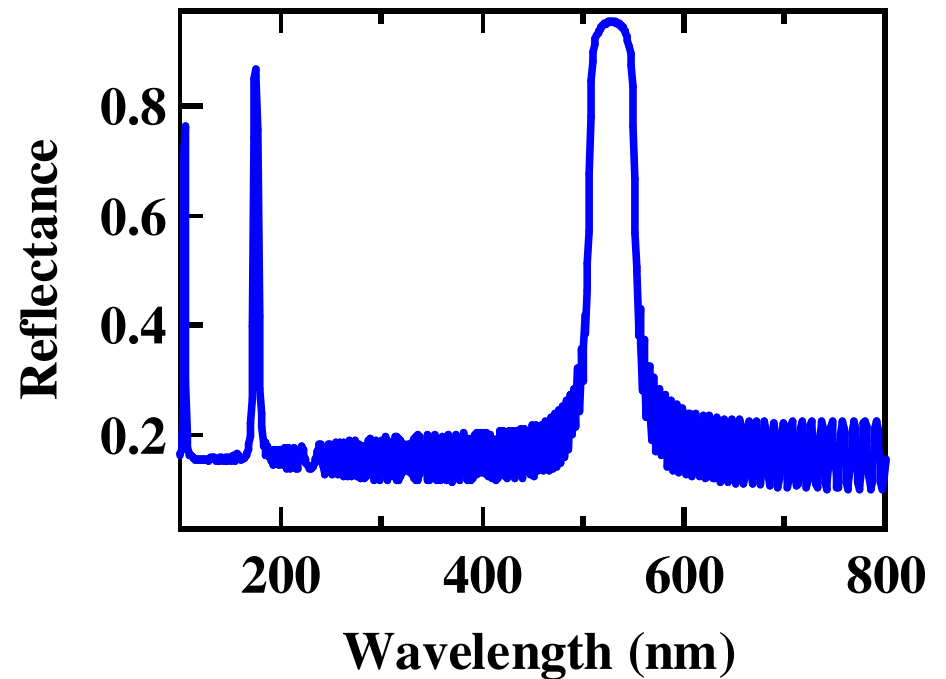
1-D Photonic Crystal

Rugate Filter
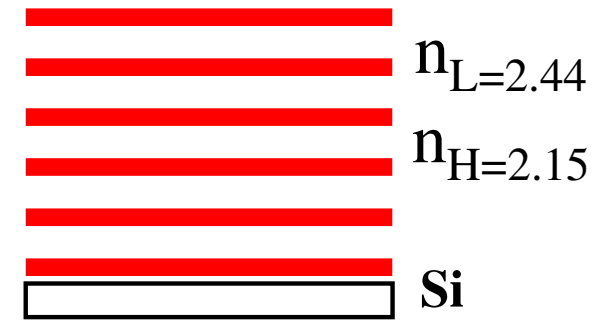

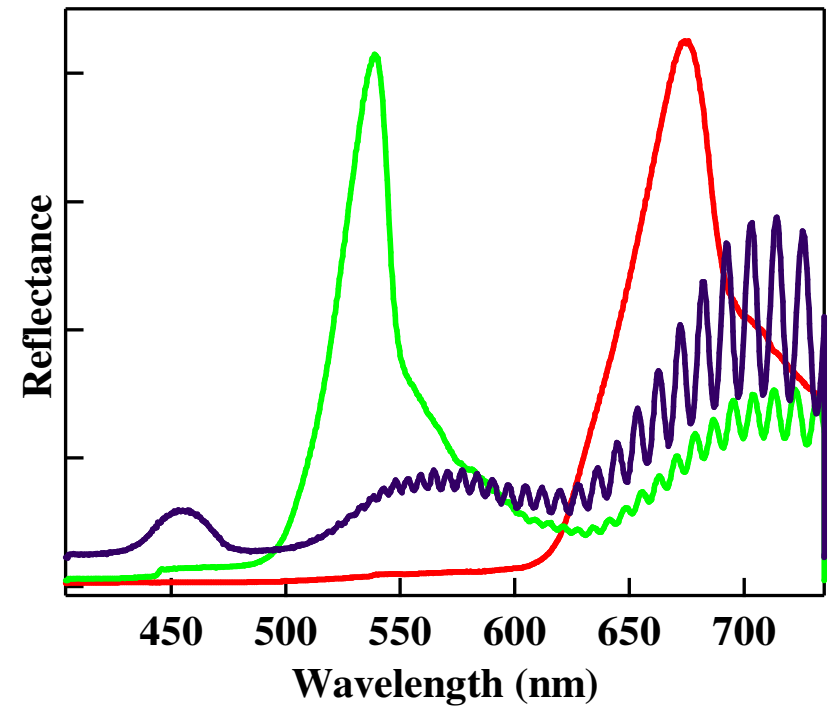$$n(x) = n_{av} + \frac{1}{2} n_{peak} \sin(\frac{4\pi n_{av} x}{\lambda_o})$$

100-Sinusoidal Cycles

Bragg Filter

$n_{L=2.44}$

$n_{H=2.15}$

Si

100-Bragg Stacks   2

Porous silicon formation

Pt Rod

C.E.

Current Source

– / +

HF-Containing Solution

Si

W.E.

Cu Plate

Reflectance

Wavelength (nm)

450 500 550 600 650 700
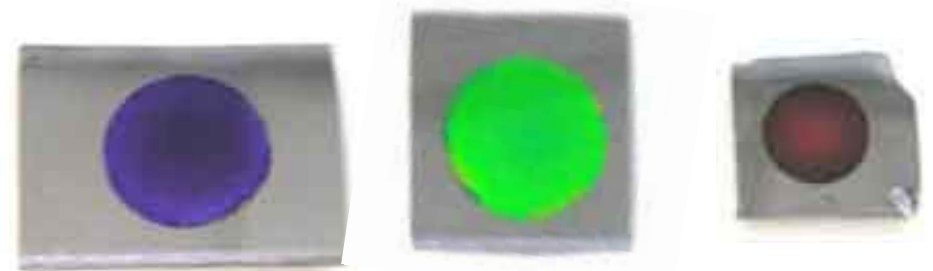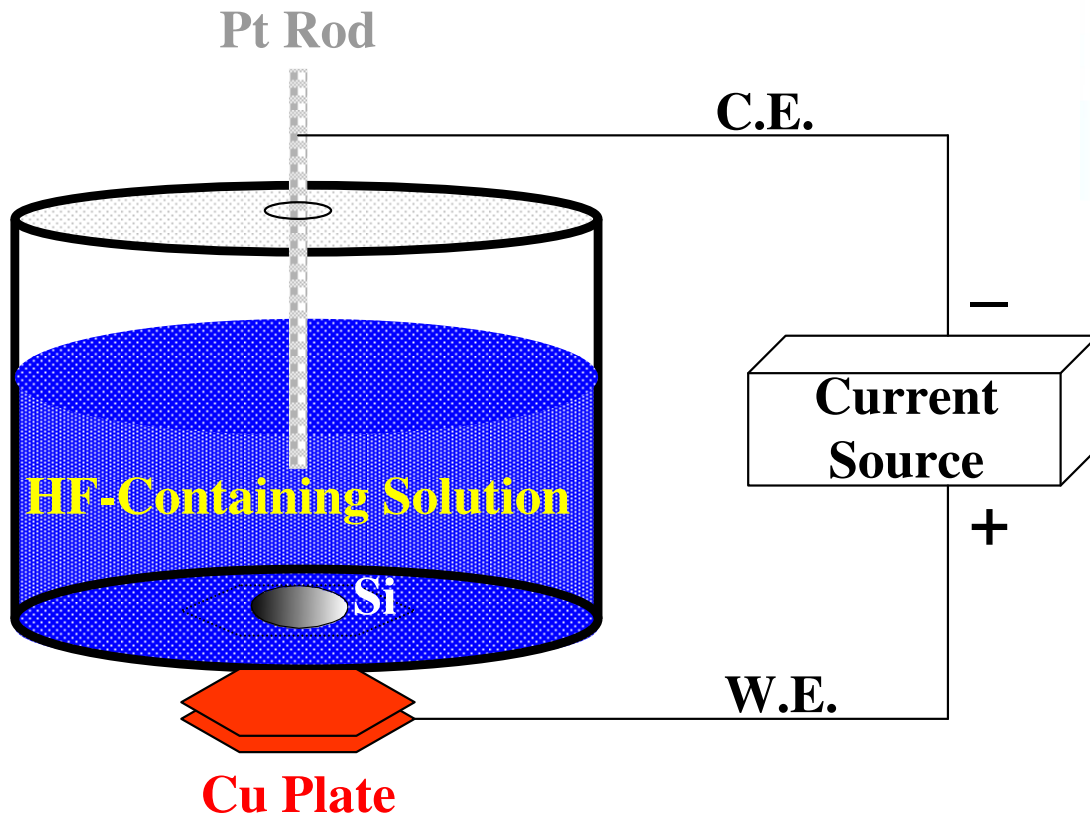
Porosity   Refractive Index   Current Density

Thickness   Anodization Time

Porous silicon photonic crystal exposed to acetone vapor. Two vapor/ vacuum dosing cycles.

University of California, San Diego http://chem-faculty.ucsd.edu/ sailor/

Template-assisted nanowires formation

Al$_2$O$_3$

Porous alumina templates

Metallic contact

Electrochemical deposition

Electrochemical deposition

Template dissolution