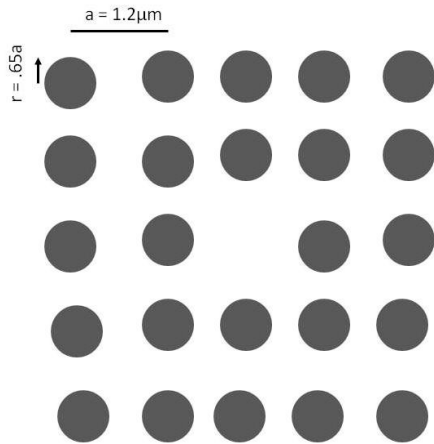1) Find a 2D slab structure that has a complete bandgap for both TE and TM modes.
    a. Calculate the first 4 bands for each polarization. Plot the band diagram for both polarizations on a single plot. Highlight the TE bandgap, the TM bandgap and the total bandgap making it clear which is which.
    b. Plot the Ez field profile for the TE mode at the M point in k space
    c. Plot the Hz field profile for the TM mode at the M point in k space
    d. Write a short summary of why this structure has both a TE and TM bandgap.
2) Calculate the resonant frequency of the default in the following structure

3) Find a paper in a peer reviewed journal that discusses an implementation of a 2D slab crystal. The paper should be not just a study of a crystal structure, but a specific implementation of a crystal for some purpose. Write a 2 page summary of the paper and be prepared to discuss it in class.