Homoepitaxial Growth of 4H-SiC layers in a Hot-Wall CVD System

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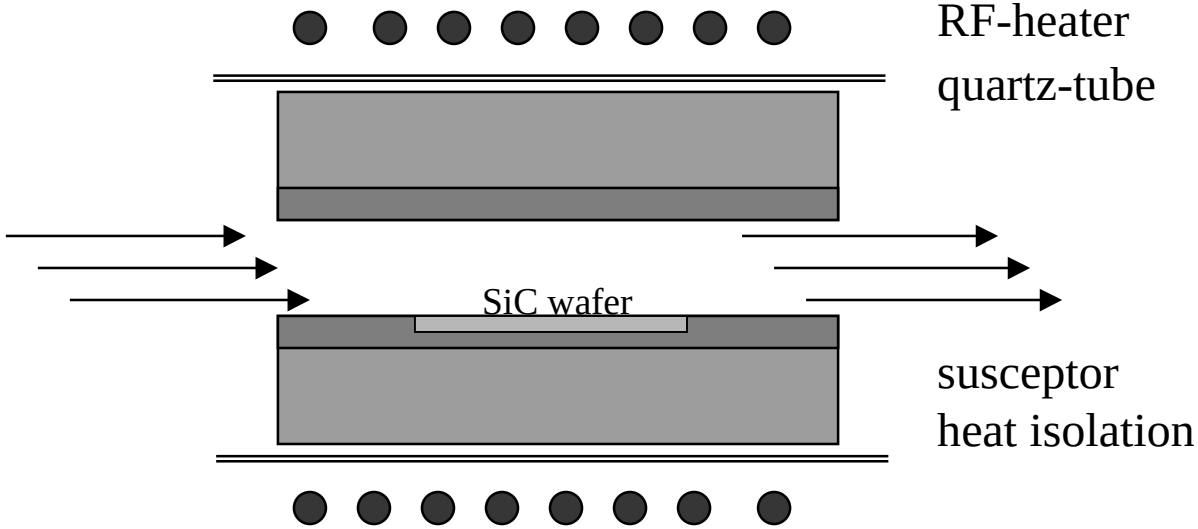
- hot-wall CVD
- thickness uniformity
- doping
  - back ground
  - n-type
  - p-type
- structural defects

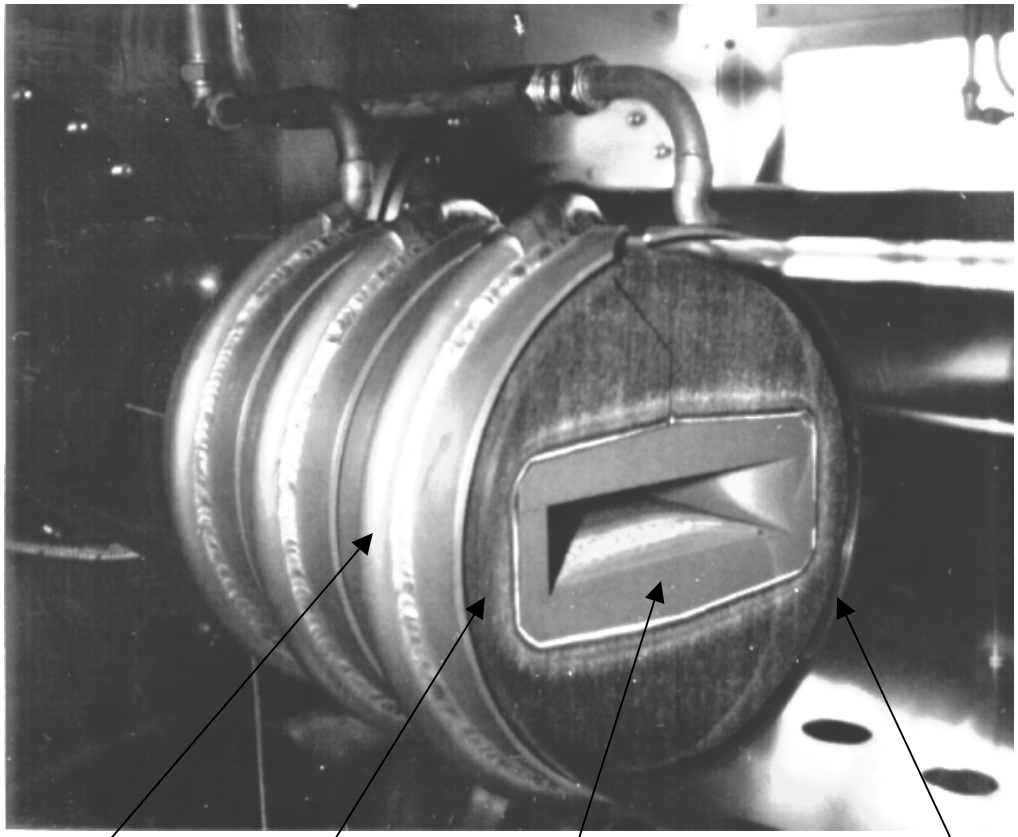
„Hot-Wall“-CVD

temperature:
1500 °C-1600 °C
wafer:
4H-SiC (Si), 8° off
process gases:
silane (2% in H_2)
propane (5% in H_2)
p-type doping:
TMA
n-type doping
nitrogen
system pressure:
100-300 mbar
carrier gas:
hydrogen, 25-50 sl/min
purge gas:
argon, 5N

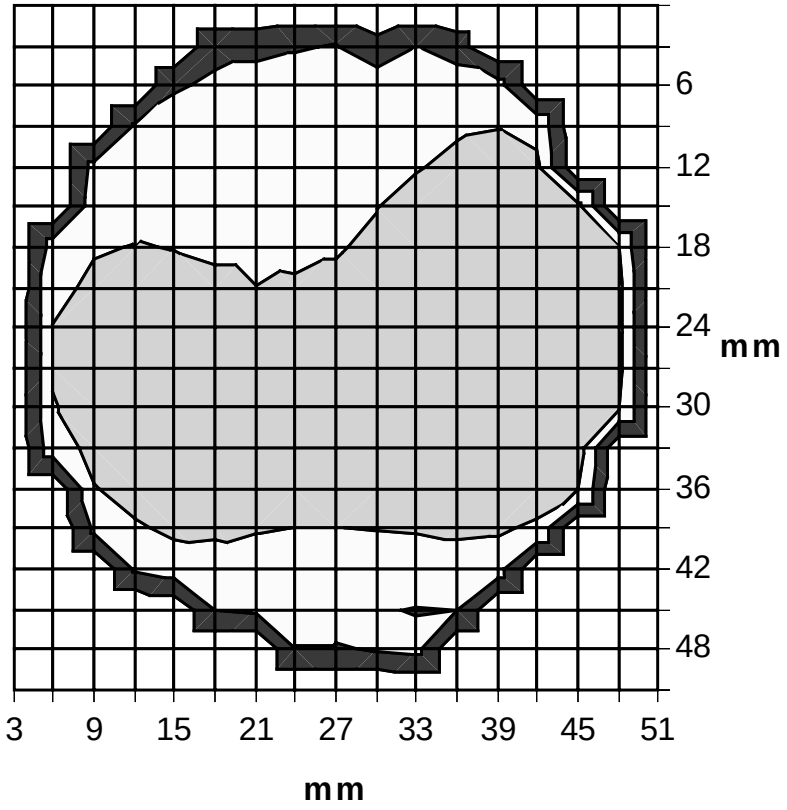
VP 508 , EPIGRESS (Sweden)

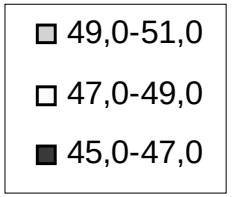


Hot-Wall CVD Reactor



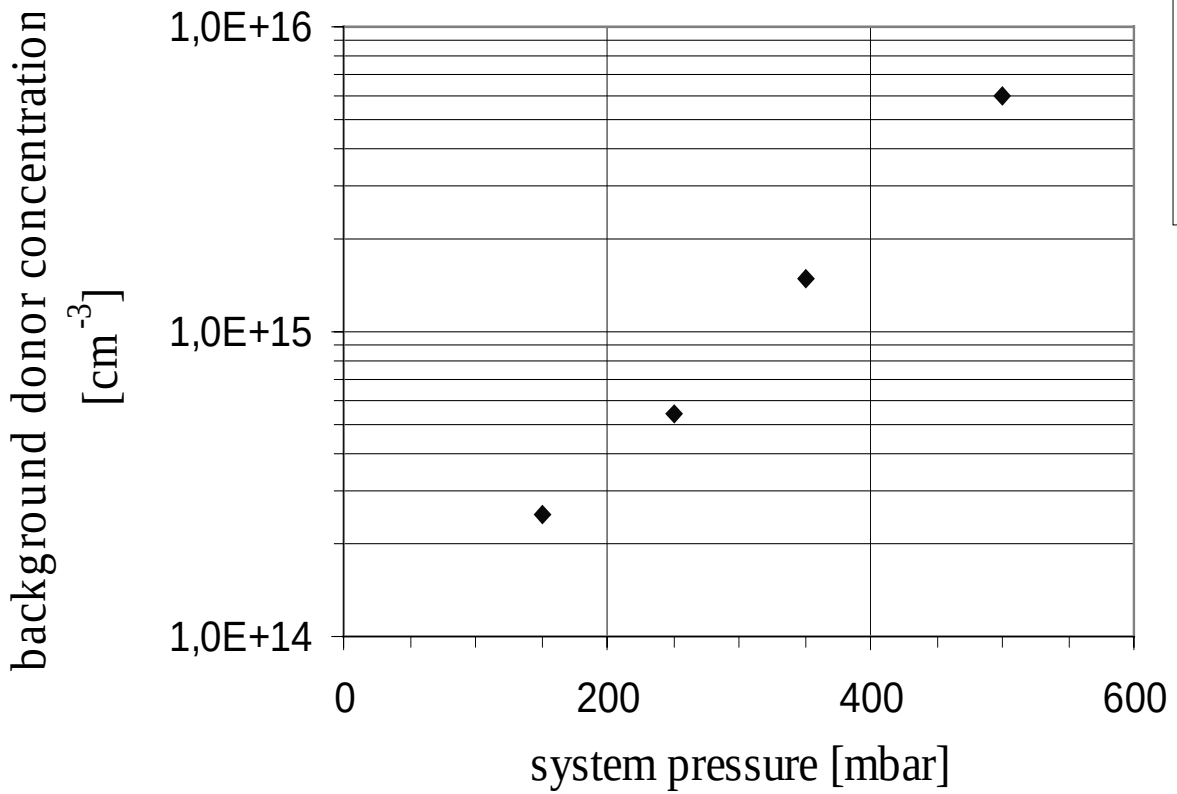
Thickness Uniformity





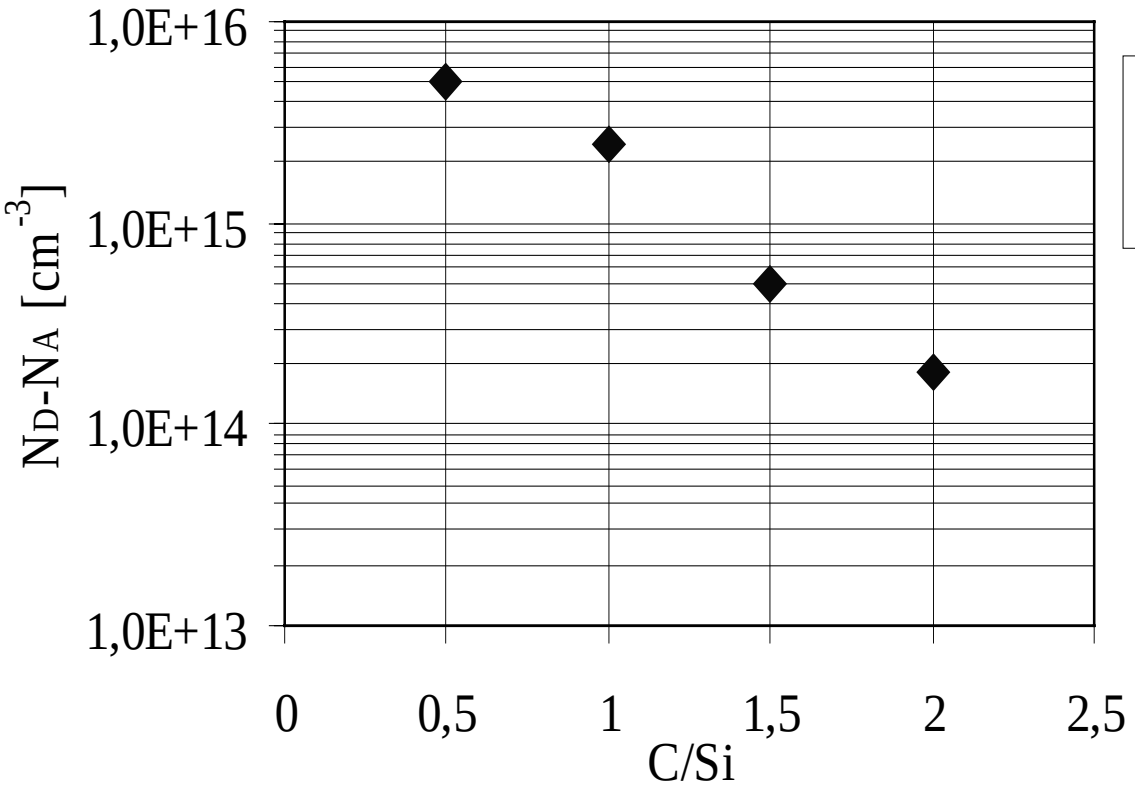
∅	= 51 mm
T_S	= 1550 °C
C/Si	= 1,5
p_{sys}	= 150 mbar
R	= 10 µm/h
d	= 48,9 µm ± 0,8%

Net Donor Concentration (N_D-N_A) vs. p_{sys}



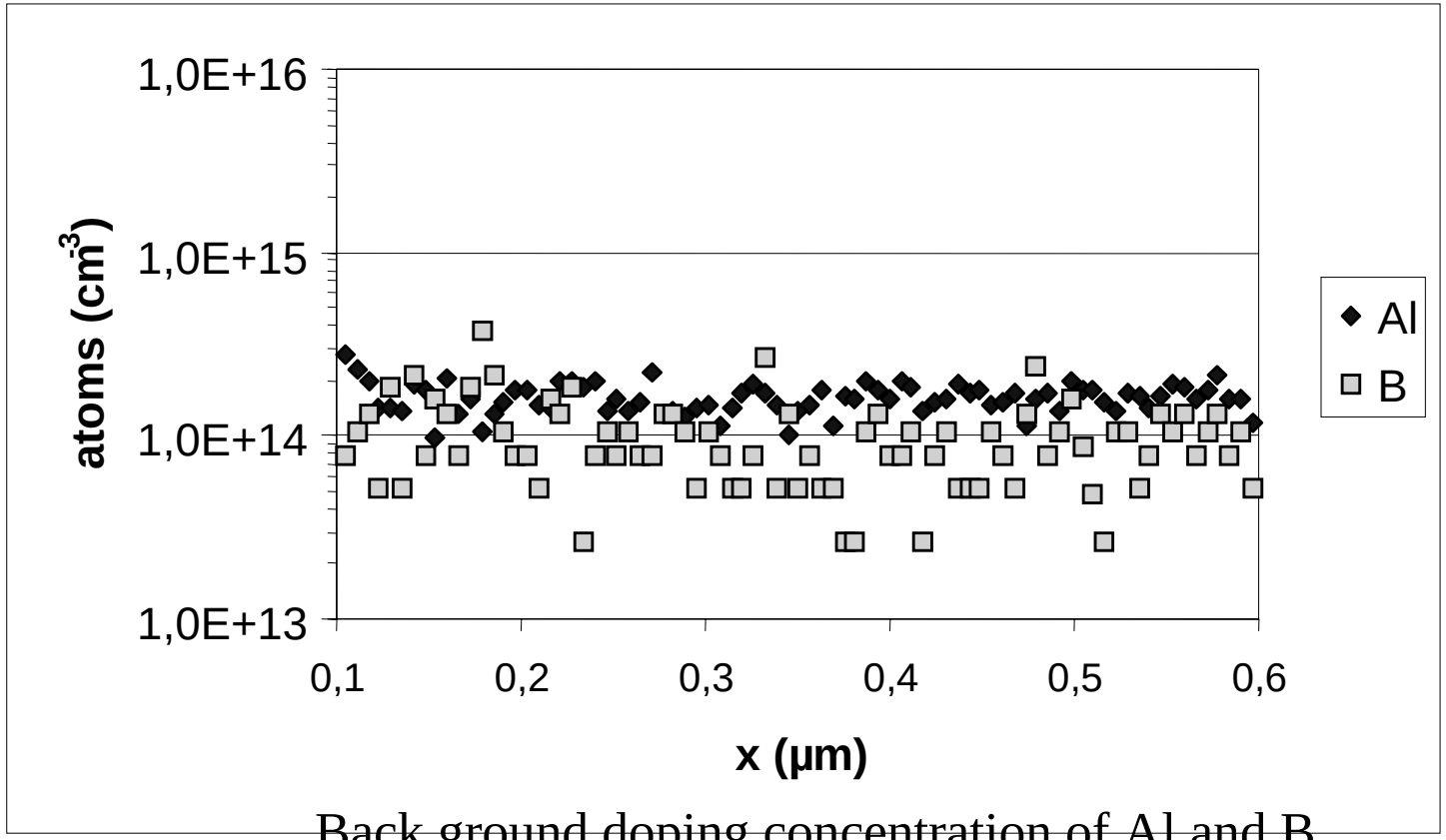
C/Si : 1.5
T_g : 1600 °C
P_{SiH_4} : 5.9×10^{-2} mbar

Net Donor Concentration (N_D-N_A) vs. C/Si Ratio



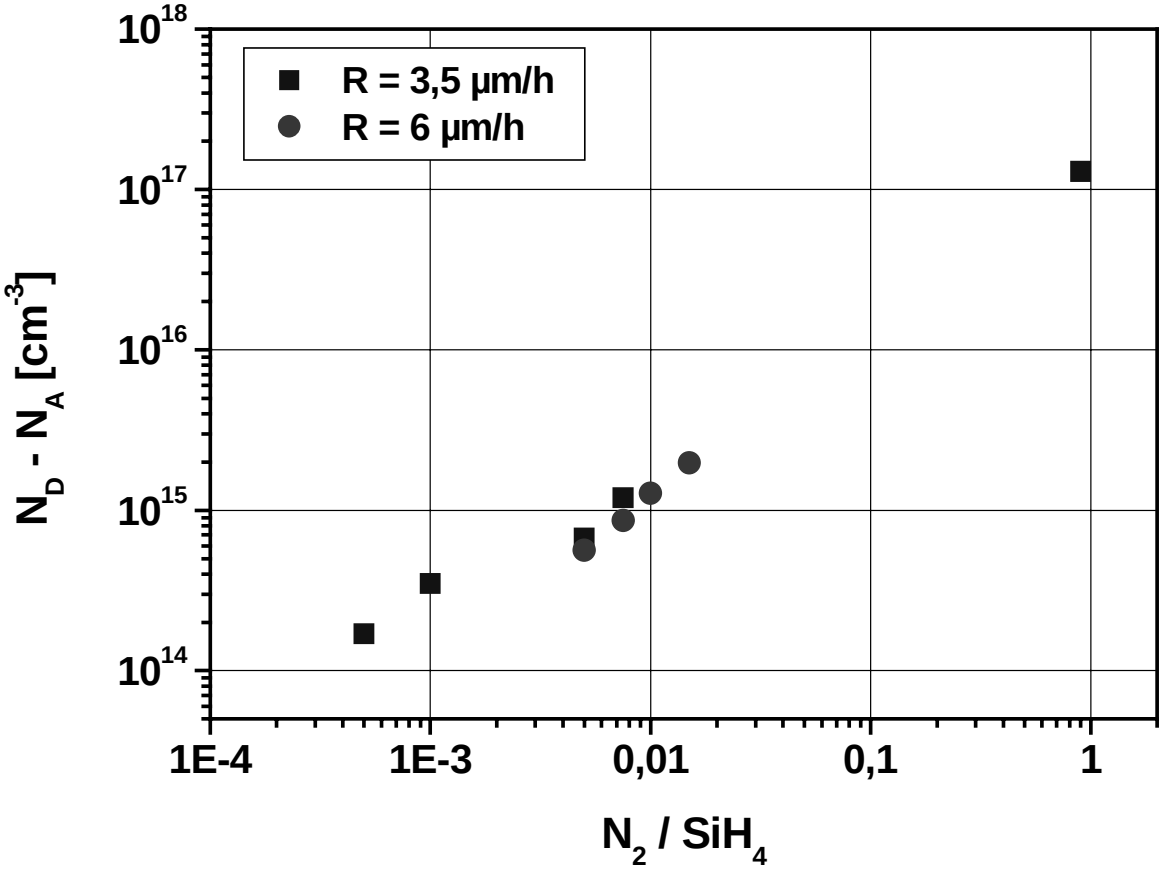
T_g = 1600 °C
P_{sys} = 250 mbar
p_{SiH4} = 4.9×10^{-2} mbar

Al- and B- Concentration Profiles (SIMS)

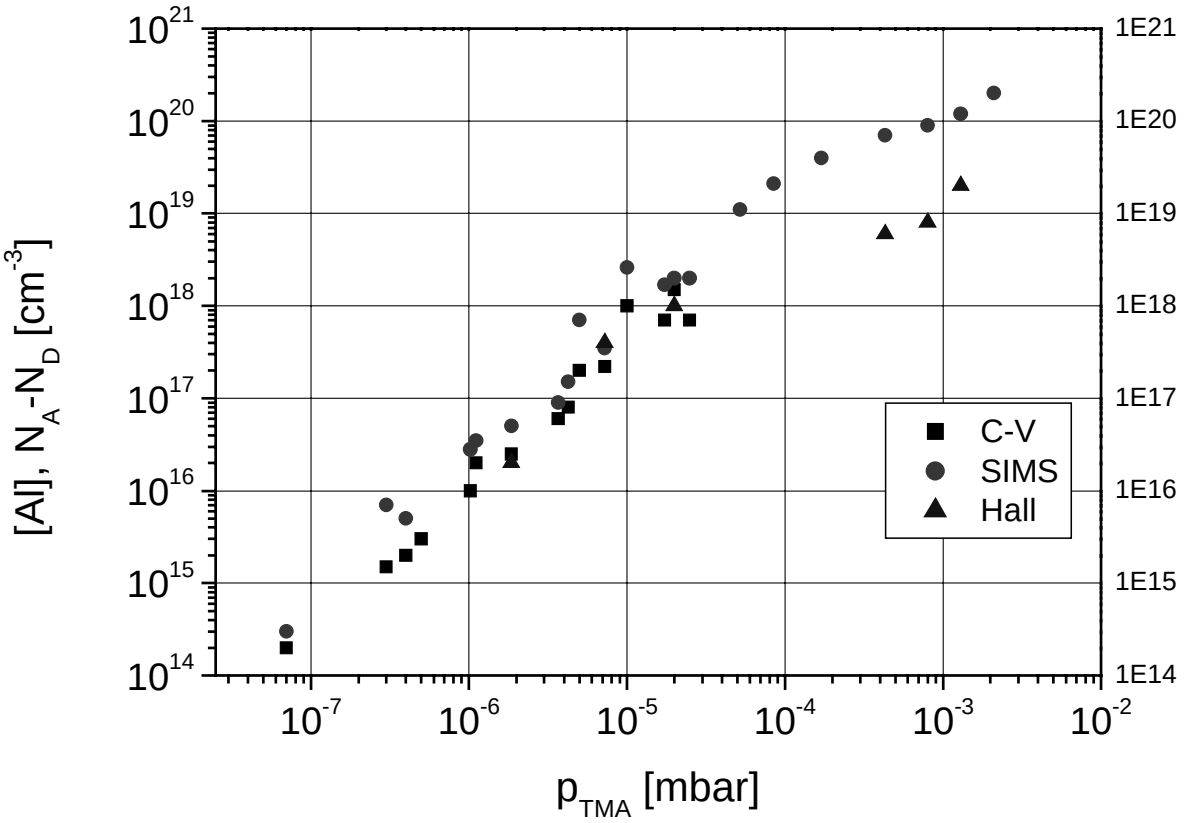


Back ground doping concentration of Al and B in unintentional doped 4H-SiC layers

N_D-N_A vs. N_2/SiH_4



N_A-N_D- Concentration vs. TMA-Partial Pressure



N_A-N_D ~ $(p_{TMA})^{1.5}$

Defects in 4H-SiC-Epi-Layers