Ising Model for a Ferromagnet

M

T_c

T

**Curie point
critical temperature**
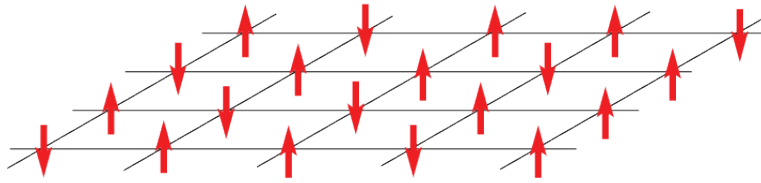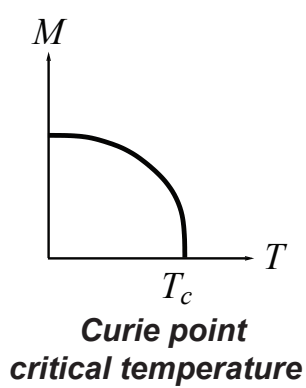
$$s_i = \begin{cases} +1 & \text{spin up} \\ -1 & \text{spin down} \end{cases}$$
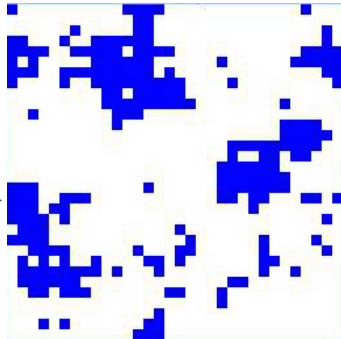
blue

white

**applied
magnetic
field**

H

$$\mathcal{H} = -H\sum_i s_i - J\sum_{<i,j>} s_i s_j$$
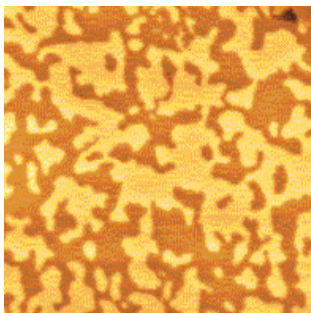
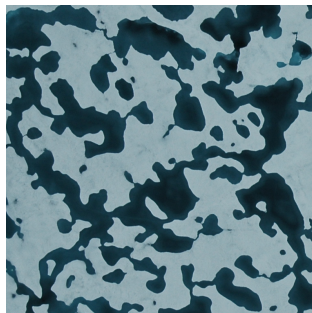**nearest neighbor Ising Hamiltonian**

*islands of
like spins*

$$M(T,H) = \lim_{N\to\infty} \frac{1}{N}\left\langle \sum_j s_j \right\rangle$$

effective magnetization

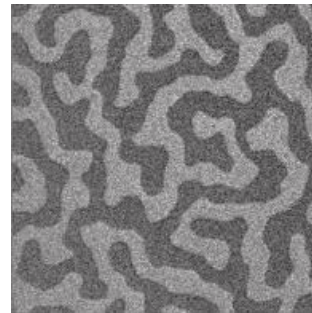energy is lowered when nearby spins align
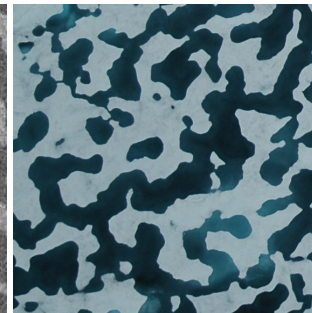with each other, forming **magnetic domains**

**magnetic domains
in cobalt**

melt ponds (Perovich)

**magnetic domains
in cobalt-iron-boron**

melt ponds (Perovich)