

ME/MSE485 HW#5, Due March 8, 2011

1. Discuss (i) the negative effects of moisture penetration into polymer materials which are used for electronic packaging, (ii) what is the governing equation for the moisture diffusion (only 1D is enough) where moisture concentration is denoted by C , (iii) what are the approaches to overcome the moisture related damage ?
2. Discuss two different failure criteria, (i) Coffin-Manson law: plastic strain (e_p) vs number of mechanical cycling (N) that results in such plastic strain, (ii) Paris-law: $da/dN = C\Delta K^m$ where C and m are the material constants, a is the current crack length, N is number of mechanical loading cycles. How to predict the life (N_{life}) of the packaging material based on Paris law.
3. If you propose to use a new material for a given electronic package design, what kind of characterization testing do you propose to do in order to predict the life of the new material.
4. If you design a new electronic package by using the numerical software programs, what kind of mechanical, thermal and physical behaviors are you going to simulate ?