# Carnegie Mellon
## Materials Science and Engineering Seminar Series
*Materials Research at Carnegie Mellon*


## Nan Boonyachut
**Graduate Research Assistant**
**Department of Materials Science and Engineering**
**Carnegie Mellon University**


## *"Discontinuous Precipitation in Cu-Ti alloys"*

**Friday, November 18, 2005**
**11:00 A.M. Seminar in Hamerschlag Hall B131**
*Refreshments precede seminar at 10:30 A.M. in 2325 Wean Hall*


The conventional Cu-Be alloys are widely used in high strength and high conductivity applications. However, the major draw back of Cu-Be is the high toxicity in Be processing. For many decades Cu-Ti alloys have been studied and believed that it is the most promising substitution of Cu-Be alloys due to its comparable strength and conductivity. The high strength of these alloys arises from the fine-scale metastable coherent/semicoherent phase embedded in the matrix. However, by overaging Cu-Ti alloys, grain boundary precipitation, which is called cellular or discontinuous precipitation, occurs and consumes the two-phase mixture in the matrix. This leads to a rapid degradation of mechanical properties of these alloys. It is therefore important to suppress or retard the nucleation and growth of the cellular or "discontinuous" precipitation reaction, in order to optimize their physical properties. In this seminar the preliminary kinetics of the cellular precipitation have been studied. It has been shown that the amount of cellular precipitation in the Cu-3 w/0 Ti alloys in the temperature range of 450°C to 525°C increases with temperature and time. The identity and stability of the phases present in the cellular colony of the overaged alloys has also been investigated. From the X-ray and TEM results it is found that the β-$Cu_4Ti$ ($Au_4Zr$) phase is present in the cellular regions at temperatures as low as 450 °C. Moreover, it is noteworthy that the β′-$Cu_4Ti$ ($D1_a$) is also found forming inside the cellular colony in the early stage of precipitation.


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Nan Boonyachut received her Bachelor of Science degree in Industrial Engineering from Chulalongkorn University 1999. She received her MS in Materials Science and Engineering from Carnegie Mellon University in June 2003. She is currently a graduate research assistant working towards her Ph.D. project entitled "Discontinuous Precipitation in Cu-Ti alloys" under the guidance of Prof. David Laughlin.