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Current Issues for next generation large area and high rate plasma process for thin film deposition

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It is well known that development of large area and high rate process is a prime technology for thin film deposition by plasma process for next generation industries including flat panel display, digital electronics, solar energy, automobile etc. The major hurdles for large area and high rate process development are film uniformity and structure control including damage which is closely associated with film properties respectively. The core topics for overcoming such hurdles can be classified as followings;

- New plasma sources for larger area film deposition
- Plasma – nano process for precision control of film structure including damage
- Fundamental understanding of film nucleation and growth for design of film structure and plasma process
- Plasma chemistry of reactive process plasma by diagnostics etc.

A variety of technologies have been recently developed for large area and high rate processes with new plasma sources and process control with in-situ monitoring of radicals etc. The plasma sources can be reached to deposit films at the substrate larger than 2,000 mm x 2,000mm and the deposition rate keeps increasing to higher than 1 μm/min. The application is still limited, however, in industrial manufacturing lines with proof of quality. Especially the fundamental understanding on reactive plasma process is not well progressed, and should be overcome for innovation of next generation plasma technology. This paper is open for discussion on current status of large area and high rate plasma technology for thin film synthesis and provides agenda on scientific and technological issues for development of next generation larger and higher rate plasma processes.