Processability and applications of selected atomic layer deposited nanomaterials

Title of the dissertation
Study of Thermal and Plasma Enhanced Atomic Layer Deposition of AlN and Al₂O₃/TiO₂ Films for Diverse Applications

Contents of the dissertation
Atomic layer deposition (ALD) technology has become one of the main drivers for miniaturizing integrated circuits and memories. They utilize the intrinsic conformality and nanometer range thickness scaling capability of the ALD thin films for the 3D architectures. Due to these advantages, ALD has also many other applications that it is being applied or could be adopted for more efficient and versatile technology.

This thesis covered studies of ALD aluminum nitride and aluminum oxide/titanium oxide thin films. Particularly the research involved ranging the ALD process factors and analyze the responses to the material growth, composition and properties. The former included for example mechanical, structural and corrosion resistance properties. The obtained results of Al₂O₃/TiO₂ film stack could be used to obtain more efficient films for example to corrosion protection of steel. In the case of the AlN, the research concentrated more on the prosessability and fundamental properties of the films but the studies can be seen to pave a way for example to conformal material depositions for future sensor generations. In general, the thesis can be considered to have technological impact by introducing novel results of prominent and widely recognized ALD processes and materials.

Field of the dissertation
Micro and nanotechnology, nanofabrication

Doctoral candidate
Perttu Sippola, Master of Science (Technology)
Born in Helsinki, 1988

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Opponent
Professor Mustafa Alevli, Marmara University, Turkey

Custos
Professor Harri Lipsanen, Aalto University School of Electrical Engineering, Department of Electronics and Nanoengineering

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Doctoral candidate’s contact information
Perttu Sippola, perttu.sippola@aalto.fi, +358 40 841 3575