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# Thickness and Roughness Control of Nanoscale Organic Photovoltaic Layer using Gravure Printing

**Jinha Hwang, Changhyun Pang, Heeyeop Chae\***

Department of Chemical Engineering, SungkyunkwanUniversity, 440-746, Suwon, Korea

Gravure printing is a well-established printing technique which is mainly used for high-quality printing of various publications. Recently it was suggested as a fabrication process for various organic electronics. Gravure printing can provide high productivity due to continuous high processing speed. In this work, we have applied gravure printing process for the organic photovoltaic device fabrication. A nanoscale layer of donor and acceptor conjugated polymers was formed by gravure printing. The photovoltaic polymer inks are printed directly onto the substrates from the patterned gravure roll. Since the typical thickness of the organic layer is in nanoscale, it is critical to control the interface properties as well as the thickness. Thickness and roughness control of nanoscale organic photovoltaic layer was characterized in gravure printing process in this work. For the active materials P3HT (poly-3-hexylthiophene) and PCBM ([6,6]-phenyl C61-butyric acid methyl ester) were adopted. We have demonstrated the thickness control by multiple printing process and the roughness control by selecting appropriate solvents.