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Biodegradable Poly(L-Lactic Acid) (PLLA) Thin Films by Plasma Polymerization ARNOLD YANG, YI-HSING CHANG, HSUN LI, TAI-WEI CHANG, YIN-CHANG LIU, National Tsing Hua University, CHENG KUNG CHENG, National Yang-Ming University — By using high concentration monomer vapor as the source for plasma generation, poly(L-lactic acids) (PLLAs) was successfully prepared in the form of thin films for the first time via plasma polymerization. The radiation damages commonly incurred from plasma processes were minimized and hence essentially all the characteristic functional groups of the monomer were retained in the resulted polymer films. The polymer demonstrated similar hydrolytic and biocompatibility properties as that of the conventional PLLA and showed significant improvements in mechanical properties, surface roughness, and cell adhesion capability. The plasma films was amorphous and nanoscopically smooth. The Young's modulus and hardness increased linearly with plasma power and could be as high as approximately 5 times of the conventional PLLA. In addition, chain crosslinking took place during the process of polymerization, and was controllable by adjusting the plasma parameters, which also strongly affected hydrolytic degradation rate of the plasma polymer.

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