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## **Stress and Strain-Induced Bubble Nucleation in Physical Foaming Process**

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The stress-induced nucleation and foaming process, which was discovered by Handa et. al, is further investigated in this paper. Applying mechanical compressive stress to a polymer / CO<sub>2</sub> system induces bubble nucleation. Experiments were conducted with poly (methylmethacrylate) and CO<sub>2</sub> system by changing amplitude and applying period of the stress to the polymer/ CO<sub>2</sub> system. Foaming is localized to the parts only where the stress is applied. The foams show a multi-layered structure, i.e., unfoamed outermost layer and the foaming layers where the cell size is 0.1 to 1 mm in diameter. The total thickness of the foamed layers decreases as the amplitude of compressive stress increases. The amplitude of compressive stress is not the key factor of determining the foam-ability, the strain caused by the compression and local concentration of CO<sub>2</sub> in polymer are the key elements of determining the foamability in the foaming. In other words, only when the strain and local CO<sub>2</sub> concentration exceed a certain threshold, bubble nucleation occurs.