

Study of porous Silicon as an energetic material

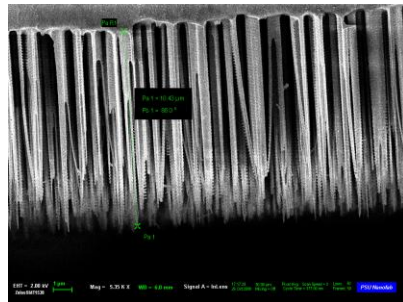
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Motivation

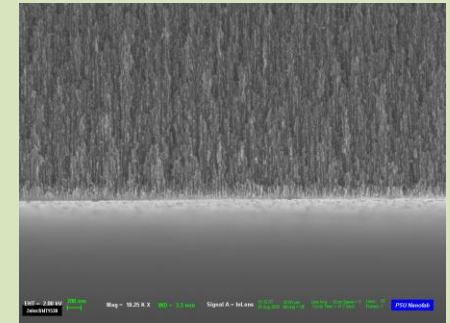
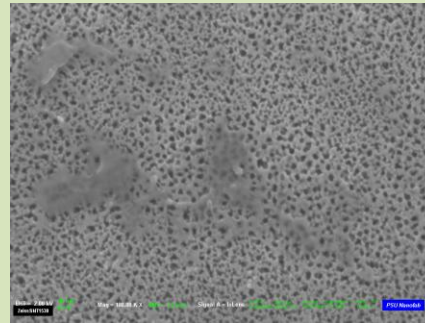
- Porous Silicon is compatible with the standard silicon microfabrication technology and can also form highly energetic systems with suitable oxidizers. These features can be combined to form small scale devices which can release energy (heat, light, pressure) on demand.

Project Status and Results

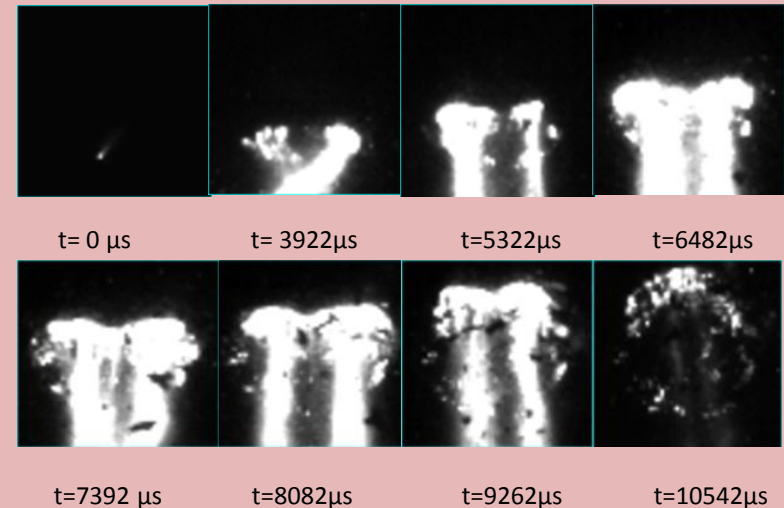
- Boron doped silicon wafers have been etched to form porous silicon by means of electrochemical etching and DRIE
- Pore diameters as small as 10 nm and depths as high as 150 μm have been obtained
- Flame propagation speed measurements on electrochemically etched silicon samples filled with different oxidizers yielded rates of ~ 1.5 m/s at room temperature and several times higher at slight preheat.



Porous silicon by DRIE



Porous silicon by electrochemical etching



Flame propagation in a porous silicon sample impregnated with Magnesium perchlorate (Flame speed ~ 1.5 m/s)