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Integration of low-loss inductors on thin porous silicon membranes

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Abstract

The rising market of flexible nomadic systems requires the development of cost-efficient processes and high performance devices. In this study, we report on a simple technique to integrate micro-inductors on a low-loss 50 μm -thick porous silicon membrane. The etching of porous silicon was performed according to a two-step anodization process in order to create a fragile interface between the silicon substrate and the porous layer. Then, the integration of radio-frequency micro-inductors followed a conventional microelectronic procedure. At the end of the process, the membranes with the devices were mechanically peeled-off from bulk silicon, providing the possible means to recycle the silicon substrate for subsequent devices integration. S-parameters measurements showed a significant improvement of the quality factor and the resonant frequency after the substrate removal. This result is promising for the near future of ultra-thin flexible electronic devices.

Keywords: On-chip inductor, porous silicon, quality factor, radiofrequency, electrochemical etching

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