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**WANG et al.**(10) **Pub. No.: US 2022/0376672 A1**(43) **Pub. Date: Nov. 24, 2022**(54) **BULK ACOUSTIC WAVE FILTER AND  
METHOD OF MANUFACTURING BULK  
ACOUSTIC WAVE FILTER**(52) **U.S. Cl.**CPC ..... *H03H 9/173* (2013.01); *H03H 3/02*  
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**ABSTRACT**

A method of manufacturing a bulk acoustic wave filter is provided, including: forming an acoustic reflection air cavity, a sacrificial layer, a seed layer, a lower electrode layer and a piezoelectric layer of n resonators on a substrate in sequence, wherein n is greater than or equal to 2; taking N from 1 to n for respectively repeating following steps: forming an N-th metal hard mask layer, defining an effective area of a first resonator to an N-th resonator by using a photolithography process, removing the N-th metal hard mask layer outside the effective area of the first resonator to the N-th resonator, oxidizing the piezoelectric layer outside the effective area of the first resonator to the N-th resonator to form an N-th oxidized part of the piezoelectric layer, and etching the N-th oxidized part of the piezoelectric layer; removing the metal hard mask layer of the effective area of the first resonator to the N-th resonator, so as to form the piezoelectric layer having different thicknesses of the first resonator to the N-th resonator; and forming an upper electrode layer on the piezoelectric layer having different thicknesses of the first resonator to the N-th resonator.

