

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2022/0407487 A1

Dec. 22, 2022 (43) Pub. Date:

(54) METHOD FOR FORMING BULK ACOUSTIC WAVE RESONANCE DEVICE

(71) Applicant: CHANGZHOU CHEMSEMI CO., LTD., Changzhou (CN)

Inventor: Yuhao LIU, Shanghai (CN)

17/640,338 Appl. No.:

(22) PCT Filed: Sep. 5, 2019

PCT/CN2019/104600 (86) PCT No.:

§ 371 (c)(1),

(2) Date: Aug. 29, 2022

Publication Classification

(51) **Int. Cl.** H03H 3/02 (2006.01)

U.S. Cl.

CPC H03H 3/02 (2013.01); H03H 2003/021 (2013.01); H03H 9/02015 (2013.01)

(57)ABSTRACT

A method for forming a bulk acoustic wave resonance device, comprising: (S201) forming a first layer, which comprises: providing a first substrate; forming a piezoelectric layer located on the first substrate; forming a first electrode layer located on the piezoelectric layer; and forming a cavity pre-treatment layer located on the piezoelectric layer, used for forming a cavity, and at least covering a first end of the first electrode layer, wherein a first side of the first layer corresponds to the side of the first substrate; a second side of the first layer corresponds to the side of the cavity pre-treatment layer; (S203) forming a second layer, which comprises: providing a second substrate; (S205) connecting the first layer to the second layer, the second layer being located at the second side; (S207) removing the first substrate, so that the first side corresponds to the side of the piezoelectric layer; and (S209) forming a second electrode layer located at the first side and contacting with the piezoelectric layer. The formed piezoelectric layer does not comprise a crystal that is significantly turned so as to facilitate increasing the electromechanical coupling coefficient and the Q value of the resonance device. In addition, the second substrate processing and the active layer processing can be respectively performed, and are flexible.

a first stack is formed, wherein forming the first stack includes: providing a first substrate; forming a piezoelectric layer on the first substrate; forming a first electrode layer on the piezoelectric layer; and forming a cavity pretreatment layer on the piezoelectric layer, wherein a cavity is to be formed based on the cavity pretreatment S201 layer which at least covers a first end of the first electrode layer, wherein a first side of the first stack corresponds to a side of the first substrate, and a second side of the first stack corresponds to a side of the cavity pretreatment layer a second stack is formed, wherein forming the second stack includes S203 providing a second substrate joining the first stack and the second stack, wherein the second stack S205 is disposed at the second side of the first stack removing the first substrate, wherein the first side of the first stack S207 corresponds to a side of the piezoelectric layer forming a second electrode layer at the first side of the first stack, wherein the second electrode layer is in contact with the piezoelectric S209 laver the cavity pretreatment laver is etched to form the cavity, wherein the S211 first end of the first electrode layer is disposed in the cavity