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(54) **TOP ELECTRODES AND DIELECTRIC SPACER LAYERS FOR BULK ACOUSTIC WAVE RESONATORS**

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(57) **ABSTRACT**

Bulk acoustic wave (BAW) resonators and particularly top electrodes with step arrangements for BAW resonators are disclosed. Top electrodes on piezoelectric layers are disclosed that include a border (BO) region with a dual-step arrangement where an inner step and an outer step are formed with increasing heights toward peripheral edges of the top electrode. Dielectric spacer layers may be provided between the outer steps and the piezoelectric layer. Passivation layers are disclosed that extend over the top electrode either to peripheral edges of the piezoelectric layer or that are inset from peripheral edges of the piezoelectric layer. Piezoelectric layers may be arranged with reduced thickness portions in areas that are uncovered by top electrodes. BAW resonators as disclosed herein are provided with high quality factors and suppression of spurious modes while also providing weakened BO modes that are shifted farther away from passbands of such BAW resonators.