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عنوان مقاله:

Phononic Crystal Sensor for Detection of D۲O Con-centration in H۲O-D۲O Mixture

محل انتشار:

دوازدهمین کنفرانس بین المللی آکوستیک و ارتعاشات (سال: 1401)

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خلاصه مقاله:

In this paper, a ۲D solid-solid phononic crystal sensor, is proposed to detect D۲O (heavy water) concentration percentage in the range of ۹۰-۱۰۰% in the H۲O-D۲O mixture. The structure is made of tungsten rods in the aluminum background. To give a resonance mode in the band diagram curve, a cavity region in throughout of a linear waveguide is designed. Finite element method (FEM) is used to calculate and analyse the transmission spectra. H۲O-D۲O mixture with different concentration percentage values of D۲O has added in the cavity region and the acoustic waves behavior is analysed. By changing the D۲O concentration in the mixture, the resonance mode is shifted. Each ۱% of D۲O concentration change causes almost ۱۲۰kHz shift of resonance modes. The performance evaluation process shows the high Q factor and high sensitivity of sensor. The other parameters FOM, SNR, and resolution also show the best performance of proposed structure. This kind of sensors also can be useful to detect the other materials with high efficiency.

کلمات کلیدی:

(Phononic crystals; Resonance Mode; Cavity; D۲O (heavy water.

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