

Title	Process for wide bandgap semiconductor nanowires obtaining on narrow bandgap semiconductor substrate
Authors	Elena Monaico, Eduard Monaico, Veaceslav Ursaki, Ion Tiginyanu
Institution	Technical University of Moldova, National Center for Materials Study and Testing
Patent no.	Patent application No. a 2021 0054 from 06.08.2021
Description EN	Herein, we propose the manufacture of wide bandgap (E_g) semiconductor nanowires (e.g. from Ga_2O_3 with $E_g = 4.9$ eV, or In_2O_3 with $E_g \sim 3$ eV) on narrow bandgap semiconductor support with good thermal conductivity (λ) (e.g. GaAs with $E_g = 1.44$ eV and $\lambda = 52$ W / m·K or InP with $E_g = 1.34$ and $\lambda = 68$ W / m·K), and the diameter of the nanowires varies in the range from 50 nm to 500 nm. The advantages of the proposed process over other already existing processes consists in the possibility of forming wide bandgap semiconductor nanowire networks on narrow bandgap semiconductor support with good thermal conductivity through simple, accessible and cost-effective technologies. In the first step, the GaAs or InP semiconductor nanowires are obtained on the surface of bulk semiconductor substrate via electrochemical etching of bulk substrates. Subsequent treatment of GaAs nanowires at 900 °C for 60 minutes in a low oxygen content atmosphere (3%) leads to the transformation of GaAs (InP) nanowires into Ga_2O_3 (In_2O_3) nanowires, accordingly to the EDX and XRD

EUROINVENT 2022 ONLINE

analysis. The technological parameters of thermal treatment are optimized in such a way that bulk semiconductor substrate is not oxidized.

This work received partial funding from the PostDoc Grant #21.00208.5007.15/PD and state program Grant #20.80009.5007.20.

Class no.

14