Optical thin films fabrication techniques—towards a low-cost solution for the integrated photonic platform: a review of the current status.

Autorzy

Muhammad A. Butt

Cuma Tyszkiewicz

Paweł Karasiński

Magdalena Zięba

Andrzej Kaźmierczak

Maria Zdończyk

Łukasz Duda

Małgorzata Guzik

Jacek Olszewski

Tadeusz Martynkien

Alicja Bachmatiuk

Ryszard Piramidowicz

Rok wydania

2022

Czasopismo

Materials

Numer woluminu

15

Strony

4591/1-4591/25

DOI

10.3390/ma15134591

Kolekcja

Naukowa

Streszczenie

In the past few decades, several methods concerning optical thin films have been established to facilitate the development of integrated optics. This paper provides a brief depiction of different techniques for implementing optical waveguide thin films that involve chemical, physical, and refractive index modification methods. Recent advances in these fabrication methods are also been presented. Most of the methods developed for the realization of the thin-films are quite efficient, but they are expensive and require sophisticated equipment. The major interest of the scientists is to develop simple and cost-effective methods for mass production of optical thin films resulting in the effective commercialization of the waveguide technology. Our research group is focused on developing a silica-titania optical waveguide platform via the sol-gel dip-coating method and implementing active and passive optical elements via the wet etching method. We are also exploring the possibility of using nanoimprint lithography (NIL) for patterning these films so that the fabrication process is efficient and economical. The recent developments of this platform are discussed. We believe that silica-titania waveguide technology developed via the sol-gel dip-coating method is highly attractive and economical, such that it can be commercialized for applications such as sensing and optical interconnects.

Słowa kluczowe

sol-gel dip-coating method, chemical vapor deposition, silica-titania waveguide platform, ion exchange, ion implantation, electron beam evaporation

Język

Angielski

Typ publikacji

Artykuł

Adres publiczny

http://dx.doi.org/10.3390/ma15134591

Strona internetowa wydawcy

http://www.mdpi.com/journal/metals