



Polarization switching and patterning in self-assembled peptide tubular structures.

Autorzy

Vladimir S. Bystrov

Ivonne Delgadillo

José Gracio

Svitlana Kopyl

Maciej Wojtaś

Elena Mishina

Alexander Sigov

Andrei L. Kholkin

Rok wydania

2012

Czasopismo

Journal of Applied Physics

Numer woluminu

111

Strony

074104/1-074104/7

DOI

10.1063/1.3699201

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

Self-assembled peptide nanotubes are unique nanoscale objects that have great potential for a multitude of applications, including biosensors, nanotemplates, tissue engineering, biosurfactants, etc. The discovery of strong piezoactivity and polar properties in aromatic dipeptides [A. Kholkin, N. Amdursky, I. Bdikin, E. Gazit, and G. Rosenman, ACS Nano **4**, 610 (2010)] opened up a new perspective for their use as biocompatible nanoactuators, nanomotors, and molecular machines. Another, as yet unexplored functional property is the ability to switch polarization and create artificial polarization patterns useful in various electronic and optical applications. In this work, we demonstrate that diphenylalanine peptide nanotubes are indeed electrically switchable if annealed at a temperature of about 150 °C. The new orthorhombic antipolar structure that appears after annealing allows for the existence of a radial polarization component, which is directly probed by piezoresponse force microscopy (PFM) measurements. Observation of the relatively stable polarization patterns and hysteresis loops via PFM testifies to the local reorientation of molecular dipoles in the radial direction. The experimental results are complemented with rigorous molecular calculations and create a solid background of electric-field induced deformation of aromatic rings and corresponding polarization switching in this emergent material. I. INTRODUCTION

Adres publiczny

<http://dx.doi.org/10.1063/1.3699201>

Strona internetowa wydawcy

<https://www.aip.org/>

Plik został wygenerowany dnia 2026-10-14 08:00:10

Adres w repozytorium <https://old.chem.uni.wroc.pl/pl/repozytorium/NLnn9dY>.