CONCLUSIONS

The electrically conducting elastomer fibers based on natural rubber (NR) and up to 10% w/w polyaniline (PANI) in its emeraldine base form can be readily fabricated by a conventional wet spinning process. The resulting fibers can be doped by immersion in aqueous HCl solution, which converts the PANI to the electrically conductive emeraldine salt form. The morphology of the composite fibers was studied by scanning electron microscopy. It appears that the PANI particles are inhomogeneously distributed in the NR matrix and preferentially migrate to the fiber surfaces. The electrical conductivity of the fibers increases with increasing PANI content by more than 7 orders of magnitude, and it levels off at a value of ca. 10^{-3} S/cm at a PANI concentration of 5% w/w. The fibers retained most of their elasticity upon doping, while the tenacity was somewhat reduced. Gratifyingly, the electrical conductivity can remain unchanged upon deformation to elongations of up to 600 %. The bending deformation of composite fiber under electric field demonstrated that the PANI/NR composite fibers display a most desirable property matrix having properties that makes them useful for applications in, for example, artificial muscles or soft actuator application.