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Corrigendum: Antenna–load interactions at optical frequencies: impedance matching to quantum systems

2012 Nanotechnology 23 444001

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Received 20 February 2013
Published 30 April 2013
Online at stacks.iop.org/Nano/24/229501

In our manuscript, we incorrectly equated electrical impedance with wave impedance in equation (3) on page 4 as

\[ Z = R - iX = \sqrt{\frac{\mu}{\epsilon}} = \sqrt{\frac{i\omega\mu}{\omega \operatorname{Re}(\epsilon) - \operatorname{Re}(\tilde{\sigma})}}. \quad (1) \]

\( \mu = \mu_0 \mu_r \) and \( \epsilon = \epsilon_0 \epsilon_r \) are the complex magnetic permeability and electric permittivity, respectively; \( \tilde{\sigma} \) is the complex conductivity.

The two types of impedances are conceptually similar in some respect, but are not equal. Electrical impedance is a measure of the opposition that a circuit presents to the passage of a current when a voltage is applied, i.e., \( Z = V/I \). On the other hand, wave impedance of an electromagnetic wave is the ratio of the transverse components (perpendicular with respect to the propagation direction) of the electric and magnetic fields, i.e., \( Z = E/H \).

Equation (3) and related text should thus read correctly:

\[ Z_{\text{elec}} = R - iX, \quad (2) \]

where \( R \) and \( X \) are related to the material parameters of the conducting medium [1], and

\[ Z_{\text{wave}} = \frac{E}{\bar{H}} = \sqrt{\frac{\mu}{\epsilon}} = \sqrt{\frac{i\omega\mu}{\omega \operatorname{Re}(\epsilon) - \operatorname{Re}(\tilde{\sigma})}}. \quad (3) \]

where \( \mu \) and \( \epsilon \) are the complex magnetic permeability and electric permittivity of the homogeneous medium.

This correction does not affect any of the subsequent discussions or conclusions we draw in our paper.

Acknowledgments

We thank George Hanson (University of Wisconsin-Milwaukee) for pointing out this oversight, and Honghua Yang for helpful discussions.

References