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Linear and nonlinear characterization of low-stress high-confinement silicon-rich nitride waveguides: erratum

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References and links

In [1], we presented an experimental study of the linear and nonlinear properties of silicon-rich nitride waveguides fabricated via low-pressure chemical vapor deposition (LPCVD). Owing to an error in the estimated coupled power in the two-pump experiment, we have overestimated the nonlinear Kerr parameter of the waveguide. The corrected Fig. 4(d) should be:

![Nonlinear phase shift \(\phi_{\text{SPM}}\) as a function of coupled pump power.](https://doi.org/10.1364/OE.25.007443)

From this figure we infer a nonlinear parameter \(\gamma = 3 \text{ (W}\cdot\text{m})^{-1}\) leading to a nonlinear coefficient \(n_2 = 0.6 \cdot 10^{-18} \text{ m}^2/\text{W}\).

The Table 1 should therefore look as follows.
Table 1. Comparison of nonlinear Kerr coefficient $n_2$ and optical band gap energy $E_g$ for silicon, silicon-enriched nitride and stoichiometric silicon nitride.

<table>
<thead>
<tr>
<th></th>
<th>$n_2$ (at 1.5 µm) [m$^2$/W]</th>
<th>$E_g$ [eV]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si [24,25] (100% Si)</td>
<td>$\sim 4 \cdot 10^{-18}$</td>
<td>1.12</td>
</tr>
<tr>
<td>Si$_x$N$_y$ (65% Si)</td>
<td>$0.6 \cdot 10^{-18}$</td>
<td>2.3</td>
</tr>
<tr>
<td>Si$_3$N$_4$ [22,27] (43% Si)</td>
<td>$0.24 \cdot 10^{-18}$</td>
<td>$\sim 5$</td>
</tr>
</tbody>
</table>

The main conclusion in [1] is still valid. Varying the relative composition between silicon and nitride during LPCVD deposition provides a higher Kerr coefficient than what is possible with stoichiometric silicon nitride.