



In conclusion, we have succeeded in the development of the ruthenium-based metathesis catalyst **4**, which exhibits excellent metathesis activity, without any loss of stability in air. These findings once again demonstrate that seemingly small variations in ligand structure can result in significant improvements in catalysis.

Experimental Section

4: CuCl (21 mg, 0.22 mmol) and then **1** (168 mg, 0.20 mmol) in CH₂Cl₂ (4 mL total) were added to a solution of **8** (94 mg, 0.39 mmol) in CH₂Cl₂ (16 mL) in a glove box. This reaction mixture was stirred for 1 h at 40 °C. The reaction mixture was concentrated in vacuo. The residue was dissolved in a minimum volume of CH₂Cl₂, passed through a Pasteur pipette containing a plug of cotton, and concentrated in vacuo. The residue was purified by flash chromatography on silica gel (4:1 hexane/MTBE) to afford **4** (99 mg, 71 %). ¹H NMR (CD₂Cl₂): δ = 0.81 (d, *J* = 6.2 Hz, 6H), 2.15–2.72 (br, 18H), 4.16 (s, 4H), 4.36 (septet, *J* = 6.2 Hz, 1H), 6.92 (dd, *J* = 0.9, 7.3 Hz, 1H), 6.99 (t, *J* = 7.5 Hz, 1H), 7.06 (br, 4H), 7.31–7.42 (m, 6H), 16.60 ppm (s, 1H); ¹³C NMR (CD₂Cl₂): δ = 19.6, 20.5, 51.2, 77.0, 120.9, 123.1, 127.3, 128.1, 128.6, 128.8, 128.9, 131.1, 132.8, 137.8, 138.5, 138.9, 139.3, 147.7, 148.5, 209.8, 297.4 ppm; IR (film): $\tilde{\nu}$ = 3492 (br), 1702 (w), 1605 (w), 1481 (m), 1449 (m), 1422 (m), 1263 (s), 1105 (m) cm⁻¹; HRMS *m/z* calcd for C₃₇H₄₂ON₂Cl₂¹⁰²Ru: [*M*⁺] 702.1711, found: 702.1719; elemental analysis calcd (%) for C₃₇H₄₂ON₂Cl₂Ru · 1/2H₂O: C 62.44, H 6.09, N 3.94; found: C 62.32; H 5.97, N 3.88.

Received: April 22, 2002 [Z19143]

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Photochemical Sensing of NO₂ with SnO₂ Nanoribbon Nanosensors at Room Temperature**

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A major area of application for nanowires and nanotubes is likely to be the sensing of important molecules, either for medical or environmental health purposes. The ultrahigh surface-to-volume ratios of these structures make their electrical properties extremely sensitive to surface-adsorbed species, as recent work has shown with carbon nanotubes,^[1,2] functionalized silicon nanowires and metal nanowires.^[3,4] Chemical nanosensors are interesting because of their potential for detecting very low concentrations of biomolecules or pollutants on platforms small enough to be used in vivo or on a microchip. Here we report the development of photochemical NO₂ sensors that work at room temperature and are based on individual single-crystalline SnO₂ nanoribbons.

Tin dioxide is a wide-bandgap (3.6 eV) semiconductor. For n-type SnO₂ single crystals, the intrinsic carrier concentration is primarily determined by deviations from stoichiometry in the form of equilibrium oxygen vacancies, which are predominantly atomic defects.^[5] The electrical conductivity of nanocrystalline SnO₂ depends strongly on surface states produced by molecular adsorption that results in space-charge layer changes and band modulation.^[6] NO₂, a combustion product that plays a key role in tropospheric ozone and smog formation, acts as an electron-trapping adsorbate on SnO₂ crystal faces and can be sensed by monitoring the electrical conductance of the material. Because NO₂ chemisorbs strongly on many metal oxides,^[7] commercial sensors based on particulate or thin-film SnO₂ operate at 300–500 °C to enhance the surface molecular desorption kinetics and continuously “clean” the sensors.^[8] The high-temperature operation of these oxide sensors is not favorable in many cases, particularly in an explosive environment. We have found that the strong photoconducting response of individual single-crystalline SnO₂ nanoribbons makes it possible to achieve equally favorable adsorption–desorption behavior at room temperature by illuminating the devices with ultraviolet (UV) light of energy near the SnO₂ bandgap. The active desorption process is thus photoinduced molecular desorption (Figure 1).^[9]

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**] This work was supported by the Camille and Henry Dreyfus Foundation, 3M Corporation, the National Science Foundation, and the University of California, Berkeley. P.Y. is an Alfred P. Sloan Research Fellow. Work at the Lawrence Berkeley National Laboratory was supported by the Office of Science, Basic Energy Sciences, Division of Materials Science of the US Department of Energy. We thank the National Center for Electron Microscopy for the use of their facilities.