

## References and remarks

- 1) Moore, J. S. *Acc. Chem. Res.* **1997**, *30*, 402-413.
- 2) Tour, J. M. *Chem. Rev.* **1996**, *96*, 537-553.
- 3) Venkataraman, D.; Lee, S.; Zhang, J.; Moore, J. S. *Nature* **1994**, *371*, 591-593.
- 4) Van Nostrum, C. F. *Adv. Mat.* **1996**, *8*, 1027-1030.
- 5) Ashton, P. R.; Chemin, A.; Claessens, C. G.; Menzer, S.; Stoddart, J. F.; White, A. J. P.; Williams, D. J. *Eur. J. Org. Chem.* **1998**, 969-981.
- 6) Mindyuk, O. Y.; Stetzer, M. R.; Heiney, P. A.; Nelson, J. C.; Moore, J. S. *Adv. Mat.* **1998**, *10*, 1363-1366.
- 7) Lahiri, S.; Thompson, J. L.; Moore, J. S. *J. Am. Chem. Soc.* **2000**, *122*, 11315-11319.
- 8) Hong, B. H.; Lee, J. Y.; Lee, C.-W.; Kim, J. C.; Bae, S. C.; Kim, K. S. *J. Am. Chem. Soc.* **2001**, *123*, 10748-10749.
- 9) Rosselli, S.; Ramminger, A.-D.; Wagner, T.; Silier, B.; Wiegand, S.; Häußler, W.; Lieser, G.; Scheumann, V.; Höger, S. *Angew. Chem.* **2001**, *113*, 3234-3237; *Angew. Chem. Int. Ed. Engl.* **2001**, *40*, 3137-3141.
- 10) Bong, D. T.; Clark, T. D.; Granja, J. R.; Ghadiri, M. R. *Angew. Chem.* **2001**, *113*, 1016-1041; *Angew. Chem. Int. Ed. Engl.* **2001**, *40*, 988-1011.
- 11) Werz, D. B.; Staeb, T. H.; Benisch, C.; Rausch, B. J.; Rominger, F.; Gleiter, R. *Org. Lett.* **2001**, *4*, 339-342.
- 12) Nakamura, K.; Okubo, H.; Yamaguchi, M. *Org. Lett.* **2001**, *3*, 1097-1099.
- 13) Höger, S.; Bonrad, K.; Rosselli, S.; Ramminger, A.-D.; Wagner, T.; Silier, B.; Wiegand, S.; Häußler, W.; Lieser, G.; Scheumann, V. *Macromol. Symp.* **2002**, *177*, 185-191.
- 14) Paek, K.; Knobler, C. B.; Maverick, E. F.; Cram, D. J. *J. Am. Chem. Soc.* **1989**, *111*, 8662-8671.
- 15) Morrison, D. L.; Höger, S. *Chem Comm.* **1996**, 2313-2314.
- 16) Tobe, Y.; Utsumi, N.; Nagano, A.; Naemura, K. *Angew. Chem.* **1998**, *110*, 1347-1349; *Angew. Chem. Int. Ed. Engl.* **1998**, *37*, 1285-1287.
- 17) Tobe, Y.; Nagano, A.; Kawabata, K.; Sonoda, M.; Naemura, K. *Org. Lett.* **2000**, *2*, 3265-3268.
- 18) Sun, S.-S.; Lees, A. J. *Organometallics* **2001**, *20*, 2353-2358.
- 19) Campbell, K.; McDonald, R.; Tykwinski, R.R. *Org. Lett.* **2001**, *3*, 1045-1048.
- 20) Campbell, K.; McDonald, R.; Tykwinski, R.R. *J. Org. Chem.* **2002**, *67*, 1133-1140.

- 21) For a similar approach with pi-stacks, see: Schramm, C. J.; Scaringe, R. P.; Stojakovic, D. R.; Hoffman, B. M.; Ibers, J. A.; Marks, T. J. *J. Am. Chem. Soc.* **1980**, *102*, 6702-6713.
- 22) Dirk, C. W.; Inabe, T.; Schoch Jr., K. F.; Marks, T. J. *J. Am. Chem. Soc.* **1983**, *105*, 1539-1550.
- 23) Marks, T. J. *J. Science* **1985**, *227*, 881-889.
- 24) Hong, B. H.; Bae, S. C.; Lee, C.-W.; Jeong, S.; Kim, K. S. *Science* **2001**, *294*, 348-351.
- 25) Tseng, G. Y.; Ellenbogen, J. C. *Science* **2001**, *294*, 1293-1294.
- 26) Gudixsen, M. S.; Lauhon, L. J.; Wang, J.; Smith, D. C.; Lieber, C. M. *Nature* **2002**, *415*, 617-620.
- 27) Lehmann, U.; Henze, O.; Schlüter, A. D. *Chem. Eur. J.* **1999**, *5*, 854-859.
- 28) Lehmann, U. Dissertation, FU Berlin **1999**.
- 29) Lehmann, U.; Schlüter, A. D. *Eur. J. Org. Chem.* **2000**, 3483-3487.
- 30) Henze, O.; Lehmann, U.; Schlüter, A.D. *Synthesis* **1999**, *4*, 683-687.
- 31) Henze, O. Dissertation FU Berlin **2000**, <http://www.diss.fu-berlin.de/2000/47/>
- 32) Henze, O.; Lentz, D.; Schlüter, A.D. *Chem. Eur. J.* **2000**, *6*, 2362-2367.
- 33) Henze, O.; Lentz, D.; Schäfer, A.; Franke, P.; Schlüter, A.D. *Chem. Eur. J.* **2002**, *8*, 357-365.
- 34) Manickam, G.; Schlüter, A. D. *Synthesis* **2000**, *3*, 442-446.
- 35) Manickam, G.; Schlüter, A.D. *Eur. J. Org. Chem.* **2000**, 3475-3481.
- 36) For an overview, see: Philp, D.; Stoddart, J. F. *J. Angew. Chem.* **1996**, *108*, 1242-1286; *Angew. Chem. Int. Ed. Engl.* **1996**, *35*, 1154-1196
- 37) DFG-Sonderforschungsbereich 448, "Mesoskopisch strukturierte Verbundsysteme", Teilprojekt A1
- 38) Haley, M. M.; Pak, J. J.; Brand, S. C. *Macrocyclic Oligo(phenylacetylenes) and Oligo(phenyldiacetylenes) in Topics in Current Chemistry 201* (Ed.: deMeijere, A., et al), Springer, Berlin, Heidelberg **1999**.
- 39) Höger, S. *J. Polym. Sci. Part A: Polym. Chem.* **1999**, *37*, 2685-2698.
- 40) See, for example: (40a) Tomasic, L.; Lorenzi, G. P. *Helv. Chim. Acta* **1987**, *70*, 1012-1016; (40b) Ghadiri, M. R.; Granja, J. R.; Milligan, R. A.; McRee, D. E.; Khazanovich, N. *Nature* **1993**, *366*, 324-327; (40c) Ghadiri, M. R.; Kobayashi, K.; Granja, J. R.; Chadha, R. K.; McRee, D. E. *Angew. Chem.* **1995**, *107*, 76-78; *Angew. Chem. Int. Ed. Engl.* **1995**, *34*, 93-95; (40d) Ranganathan, D.; Haridas, V.; Madhusudanan, K. P.; Roy, R.; Nagaraj, R.; John, G. B.; Sukhaswami, N.B. *Angew. Chem.* **1996**, *108*, 1193-1195; *Angew. Chem. Int. Ed. Engl.* **1996**, *35*, 1105-1107; (40e) Scheraga, H. A. *Cyclic Peptides and Loops in Proteins*, in *Large*

- Ring Molecules* (Ed.: J. A. Semlyen), J. Wiley & Sons, Chichester, **1996**, Chapter 3, p. 99-112; (40f) Gauthier, D.; Baillargeon, P.; Drouin, M.; Dory, Y. L. *Angew. Chem.* **2001**, *113*, 4771-4774; *Angew. Chem Int. Ed. Engl.* **2001**, *40*, 4635-4638.
- 41) See, for example: (41a) Harada, A. *Cyclodextrins*, in *Large Ring Molecules* (Ed.: J. A. Semlyen), J. Wiley & Sons, Chichester, **1996**, Chapter 11, p. 407-432; (41b) Ashton, P. R.; Cantrill, S. J.; Gattuso, G.; Menzer, S.; Nepogodiev, S. A.; Shipway, A. N.; Stoddart, J. F.; Williams, D. J. *Chem. Eur. J.* **1997**, *3*, 1299-1314; (41c) Fulton, D. A.; Stoddart, J. F. *J. Org. Chem.* **2001**, *66*, 8309-8319; (41d) Anibarro, M.; Gessler, K.; Uson, I.; Sheldrick, G. M.; Harata, K.; Uekama, K.; Hirayama, F.; Abe, Y.; Saenger, W. *J. Am. Chem. Soc.* **2001**, *123*, 11854-11862.
- 42) See, for example: (42a) Fujita, M.; Yazaki, J.; Ogura, K. *J. Am. Chem. Soc.* **1990**, *112*, 5645-5647; (42b) Stang, P. J.; Persky, N. E.; Manna, J. *J. Am. Chem. Soc.* **1997**, *119*, 4777-4778; (42c) Stang, P. J. *Chem. Eur. J.* **1998**, *4*, 19-27; (42d) Newkome, G. R.; Joon Cho, T.; Moorefield, C. N.; Baker, G. R.; Cush, R.; Russo, P. S. *Angew. Chem.* **1999**, *111*, 3899-3903; *Angew. Chem. Int. Ed. Engl.* **1999**, *38*, 3717-3721; (42e) Leininger, S.; Olenyuk, B.; Stang, P. J. *Chem. Rev.* **2000**, *100*, 853-908.
- 43) Staab, H.A.; Binning, F. *Chem. Ber.* **1967**, *100*, 293-305.
- 44) Zhang, J.; Pesak, D. J.; Ludwick, J. L.; Moore, J. S. *J. Am. Chem. Soc.* **1994**, *116*, 4227-4239.
- 45) Anderson, H. L.; Sanders, J. K. M. *Angew. Chem.* **1990**, *102*, 1478-1479; *Angew. Chem. Int. Ed. Engl.* **1990**, *29*, 1400-1403.
- 46) Höger, S.; Meckenstock, A.-D.; Pellen, H. *J. Org. Chem.* **1997**, *62*, 4556-4557.
- 47) Höger, S.; Meckenstock, A.-D. *Chem. Eur. J.* **1999**, *5*, 1686-1691.
- 48) Höger, S.; Meckenstock, A.-D. *Tet. Lett.* **1998**, *39*, 1735-1736.
- 49) Shortell, D. B.; Palmer, L. C.; Tour, J. M. *Tet.* **2001**, *57*, 9055-9065.
- 50) Velten, U.; Rehahn, M. *Macromol. Chem. Phys.* **1998**, *199*, 127-40.
- 51) (51a) Nitschke, J. R.; Zürcher, S.; Don Tilley, T. *J. Am. Chem. Soc.* **2000**, *122*, 10345-10352; (51b) Nitschke, J. R.; Don Tilley, T. *J. Am. Chem. Soc.* **2001**, *123*, 10183-10190; (51c) Nitschke, J. R.; Don Tilley, T. *Angew. Chem.* **2001**, *113*, 2200-2203, *Angew. Chem. Int. Ed. Engl.* **2001**, *40*, 2142-2145; (51d) Schafer, L. L.; Don Tilley, T. *J. Am. Chem. Soc.* **2001**, *123*, 2683-2684; (51e) Schafer, L. L.; Nitschke, J. R.; Mao, S. S. H.; Liu, F.-Q.; Harder, G.; Haufe, M.; Tilley, T. D. *Chem. Eur. J.* **2002**, *8*, 74-83.
- 52) Staab, H.A.; Neunhoeffler, K. *Synthesis* **1974**, 424.
- 53) Hosokawa, Y.; Kawase, T.; Oda, M. *Chem. Comm.* **2001**, 1948-1949.

- 54) Ge, P.-H.; Fu, W.; Herrmann, A.; Herdtweck, E.; Campana, C.; Adams, R.D.; Bunz, U.H.F. *Angew. Chem.* **2000**, *112*, 3753-3756; *Angew. Chem. Int. Ed. Engl.* **2000**, *39*, 3607-3610.
- 55) Orita, A.; An, D. L.; Nakano, T.; Yaruva, J.; Ma, N.; Otera, J. *Chem. Eur. J.* **2002**, *8*, 2005-2010.
- 56) See, for example: (56a) Newkome, G. R.; Lee, H.-W. *J. Am. Chem. Soc.* **1983**, *105*, 5956-5957; (56b) Toner, J. L. *Tet. Lett.* **1983**, *24*, 2707-2710; (56c) Bell, T. W.; Cragg, P. J.; Drew, M. G. B.; Firestone, A.; Kwok, A. D.-I.; Liu, J.; Ludwig, R. T.; Papoulis, A. T. *Pure & Appl. Chem.* **1993**, *65*, 361-366; (56d) Kelly, T. R.; Lee, Y.-J.; Mears, R. J. *J. Org. Chem.* **1997**, *62*, 2774-2781.
- 57) (57a) Anderson, H. L.; Sanders, J. K. M. *J. Chem. Soc., Chem. Comm.* **1989**, 1714-1715; (57b) Anderson, S.; Anderson, H. L.; Sanders, J. K. M. *Angew. Chem.* **1992**, *104*, 921-924; *Angew. Chem. Int. Ed. Engl.* **1992**, *31*, 907-910; (57c) Anderson, H. L.; Sanders, J. K. M. *J. Chem. Soc., Chem. Comm.* **1992**, 946-947; (57d) Mackay, L. G.; Anderson, H. L.; Sanders, J. K. M. *J. Chem. Soc., Chem. Comm.* **1992**, 43-44; (57e) Anderson, S.; Anderson, H. L.; Sanders, J. K. M. *Acc. Chem. Res.* **1993**, *26*, 469-475; (57f) Walter, C. J.; Anderson, H. L.; Sanders, J. K. M. *J. Chem. Soc., Chem. Comm.* **1993**, 458-460; (57g) Anderson, H. L.; Bashall, A.; Henrick, K.; McPartlin, M.; Sanders, J. K. M. *Angew. Chem.* **1994**, *106*, 445-447; *Angew. Chem. Int. Ed. Engl.* **1994**, *33*, 429-431; (57h) Anderson, S.; Anderson, H. L.; Bashall, A.; McPartlin, M.; Sanders, J. K. M. *Angew. Chem.* **1995**, *107*, 1196-1200; *Angew. Chem. Int. Ed. Engl.* **1995**, *34*, 1096-1099; (57i) Nakash, M.; Sanders, J. K. M. *J. Chem. Soc., Perkin Trans. 2* **2001**, 2189-2194.
- 58) Schmittel, M.; Ammon, H. *Synlett* **1999**, *6*, 750-752.
- 59) Maruyama, S.; Hokari, H.; Wada, T.; Sasabe, H. *Synthesis* **2001**, 1794-1799.
- 60) Baxter, P. N. W. *J. Org. Chem.* **2001**, *66*, 4170-9.
- 61) (61a) Krömer, J.; Rios-Carreras, I.; Fuhrmann, G.; Musch, C.; Wunderlin, M.; Debaerdemaeker, T.; Mena-Osteritz, E.; Bäuerle, P. *Angew. Chem.* **2000**, *112*, 3623-8; *Angew. Chem. Int. Ed. Engl.* **2000**, *39*, 3481-3486; (61b) Fuhrmann, G.; Krömer, J.; Bäuerle, P. *Synth. Met.* **2001**, *119*, 125-126.
- 62) Mena-Osteritz, E.; Bäuerle, P. *Adv. Mat.* **2001**, *13*, 243-246.
- 63) Mongin, O.; Schuwey, A.; Vallot, M.-A.; Gossauer, A. *Tet. Lett.* **1999**, *40*, 8347-8350.
- 64) Rucareanu, S.; Mongin, O.; Schuwey, A.; Hoyler, N.; Gossauer, A. *J. Org. Chem.* **2001**, *66*, 4973-4988.

- 65) (65a) Li, J.; Ambroise, A.; Yang, S. I.; Diers, J. R.; Seth, J.; Wack, C. R.; Bocian, D. F.; Holten, D.; Lindsey, J. S. *J. Am. Chem. Soc.* **1999**, *121*, 8927-40; (65b) Yu, L.; Lindsey, J. S. *J. Org. Chem.* **2001**, *66*, 7402-7419; (65c) Holten, D.; Bocian, D. F.; Lindsey, J. S. *Acc. Chem. Res.* **2002**, *35*, 57-69.
- 66) Nitschke, J. R.; Don Tilley, T. *J. Org. Chem.* **1998**, *63*, 3673-3676.
- 67) Hensel, V.; Schlüter, A.D. *Liebigs Ann./Recueil* **1997**, *130*, 303-309.
- 68) Hensel, V.; Lützow, K.; Jakob, J.; Gessler, K.; Saenger, W.; Schlüter, A.D. *Angew. Chem.* **1997**, *109*, 2768-2770; *Angew. Chem. Int. Ed. Engl.* **1997**, *36*, 2654-2656.
- 69) Lützow, K. Dissertation, FU Berlin **1997**.
- 70) Hensel, V. Dissertation, FU Berlin **1998**.
- 71) Schlüter, A. D.; Hensel, V.; Liess, P.; Lützow, K. *Towards Oligophenylene Cycles and Related Structures: A Repetitive Approach in Modular Chemistry, Vol 499* (Ed.: J. Michl), Nato ASI Series C, Kluwer, Dordrecht, **1997**, p.241.
- 72) Hensel, V.; Schlüter, A.D. *Chem. Eur. J.* **1999**, *5*, 421-429.
- 73) Hensel, V.; Schlüter, A.D. *Eur. J. Org. Chem.* **1999**, 451-8.
- 74) Müller, P.; Usón, I.; Hensel, V.; Schlüter, A. D.; Sheldrick, G. M. *Helv. Chim. Acta.* **2001**, *84*, 778-785.
- 75) For a comparison of the solubilizing effect of different alkyl substituents, see: Blatter, K.; Schlüter, A.-D.; Wegner, G. *J. Org. Chem.* **1989**, *54*, 2396-2401.
- 76) Tsuji, J. *Palladium Reagents and Catalysts: Innovations in Organic Synthesis*, JohnWiley & Sons, Chichester, **1995**.
- 77) Kalinin, V. N. *Synthesis* **1992**, 413-432.
- 78) Miyaura, N.; Suzuki, A. *Chem. Rev.* **1995**, *95*, 2457-2483.
- 79) (79a) Stille, J. K.; Lau, K. S. Y. *Acc. Chem. Res.* **1977**, 434-442; (79b) Stille, J. K. *Angew. Chem.* **1986**, *98*, 504-519; *Angew. Chem. Int. Ed. Engl.* **1986**, *25*, 504-519.
- 80) Fitton, P.; Rick, E. A. *J. Organomet. Chem.* **1971**, *28*, 287-291.
- 81) Smith, G. B.; Dezeny, G. C.; Hughes, D. L.; King, A. O.; Verhoeven, T. R. *J. Org. Chem.* **1994**, *59*, 8151-8156.
- 82) (82a) Varma, R. S.; Naicker, K. P. *Tet. Lett.* **1999**, *40*, 439-442; (82b) Zhang, T. Y.; Allen, M. J. *Tet. Lett.* **1999**, *40*, 5813-5816.
- 83) (83a) Cianfriglia, P.; Narducci, V.; LoSterzo, C.; Viola, E.; Bocelli, G.; Kodenkandath, T. *A. Organometallics* **1996**, *15*, 5220-5230; (83b) Casado, A. L.; Espinet, P. *J. Am. Chem. Soc.* **1998**, *120*, 8978-8985; (83c) Casado, A. L.; Espinet, P.; Gallego, A. M. *J. Am. Chem. Soc.*

- 2000**, 122, 11771-11782; (83d) Amatore, C.; Bucaille, A.; Fuxa, A.; Jutand, A.; Meyer, G.; Ntepe, A. N. *Chem Eur. J.* **2001**, 7, 2134-2142.
- 84) Littke, A. F.; Fu, G. C. *Angew. Chem.* **1999**, 111, 2568-2573; *Angew. Chem. Int. Ed. Engl.* **1999**, 38, 2413-2416.
- 85) (85a) Old, D. W.; Wolfe, J. P.; Buchwald, S. L. *J. Am. Chem. Soc.* **1998**, 120, 9722-9723; (85b) Zapf, A.; Beller, M. *Chem. Eur. J.* **2001**, 7, 2908-2915; (85c) Alcazar-Roman, L. M.; Hartwig, J. F. *Organometallics* **2002**, 21, 491-502; (85d) Schareina, T.; Kempe, R. *Angew. Chem.* **2002**, 114, 1591-1594; *Angew. Chem. Int. Ed. Engl.* **2002**, 41, 1521-1523.
- 86) (86a) Grushin, V. V.; Alper, H. *Chem. Rev.* **1994**, 94, 1047-1062; (86b) Lohse, O.; Thevenin, P.; Waldvogel, E. *Synlett* **1999**, 45-48.
- 87) (87a) Gronowitz, S.; Björk, P.; Malm, J.; Hörnfeldt, A.-B. *J. Organomet. Chem.* **1993**, 460, 127-129; (87b) Saá, J. M.; Martorell, G. *J. Org. Chem.* **1993**, 58, 1963-1966.
- 88) Farina, V.; Kapadia, S.; Krishnan, B.; Wang, C.; Liebeskind, L. S. *J. Org. Chem.* **1994**, 59, 5905-5911.
- 89) (89a) Sonogashira, K.; Thoda, Y.; Hagihara, N. *Tet. Lett.* **1975**, 16, 4467-4470; (89b) Sonogashira, K. *Coupling Reactions Between  $sp^2$  and  $sp$  Carbon Centers in Comprehensive Organic Synthesis*, Vol. 3 (Ed.: B. M. Trost), Pergamon, New York, **1991**, Chapter 2.4.
- 90) Nakamura, K.; Okubo, H.; Yamaguchi, M. *Synlett* **1999**, 5, 549-550.
- 91) Alami, M.; Ferri, F.; Linstrumelle, G. *Tet. Lett.* **1993**, 34, 6403-6406.
- 92) Thorand, S.; Krause, N. *J. Org. Chem.* **1998**, 63, 8551-8553.
- 93) (93a) Böhm, V. P. W.; Herrmann, W. A. *Eur. J. Org. Chem.* **2000**, 3679-3681; (93b) Hundertmark, T; Littke, A. F.; Buchwald, S. L.; Fu, G. C. *Org. Lett.* **2000**, 2, 1729-1731.
- 94) For a study on the regiochemistry of the Sonogashira reaction of aryl halides, see: Singh, R.; Just, G. *J. Org. Chem.* **1989**, 54, 4453-4457.
- 95) For a pincer complex based catalyst for the coupling of aryl chlorides with phenylacetylenes, see: Eberhard, M. R.; Wang, Z.; Jensen, M. C. *Chem. Comm.* **2002**, 818-819.
- 96) Farina, V.; Krishnan, B.; Marshall, D. R.; Roth, G. P. *J. Org. Chem.* **1993**, 58, 5434-5444.
- 97) Only one rather small 22-membered cyclic structure was reported via Cu(II)-catalyzed homocoupling of stannylated precursors (a); also here, hydro-destannylation was problematic (b). (97a) Iyoda, M.; Kondo, T.; Nakao, K.; Hara, K.; Kuwatani, Y.; Yoshida, M.; Matsuyama, H. *Org. Lett.* **2000**, 2, 2081-2083; (97b) Iyoda, M.; Nakao, K.; Kondo, T.; Kuwatani, Y.; Yoshida, M.; Matsuyama, H.; Fukami, K.; Nagase, S. *Tet. Lett.* **2001**, 42, 6869-6872.

- 98) (98a) Bunz, U. H. F. *Angew. Chem.* **1994**, *106*, 1127-1131; *Angew. Chem. Int. Ed. Engl* **1994**, *33*, 1073-1076; (98b) Haley, M. M. *Synlett* **1998**, 557-565.
- 99) Siemsen, P.; Livingston, R. C.; Diederich, F. *Angew. Chem.* **2000**, *112*, 2740-2767; *Angew. Chem. Int. Ed. Engl.* **2000**, *39*, 2632-2657.
- 100) Glaser, C. *Ber. Dtsch. Chem. Ges.* **1869**, *2*, 422-424.
- 101) Eglington, G.; Galbraith, A. R. *J. Chem. Soc.* **1959**, *1*, 889-896.
- 102) Hay, A. S. *J. Org. Chem.* **1962**, *27*, 3320-3321.
- 103) O'Krongly, D.; Denmeade, R.; Chiang, M. Y.; Breslow, R. *J. Am. Chem. Soc.* **1985**, *107*, 5544-5545.
- 104) (104a) Rossi, R.; Carpita, A.; Bigelli, C. *Tet. Lett.* **1985**, *26*, 523-526; (104b) Takano, S.; Sugihara, T.; Ogasawara, K. *Synlett* **1990**, 453-454.
- 105) Liu, Q.; Burton, D. J. *Tet. Lett.* **1997**, *38*, 4371-4374.
- 106) Alper, H.; Saldana-Maldonado, M. *Organometallics* **1989**, *8*, 1124-1125.
- 107) Moore, J. S.; Zhang, J. *Angew. Chem.* **1992**, *104*, 873-874; *Angew. Chem. Int. Ed. Engl.* **1992**, *31*, 922-924.
- 108) Kelly, T. R.; Lebedev, R. L. *J. Org. Chem.* **2002**, *67*, 2197-2205.
- 109) For a method for phenanthrolines, see: Liu, S.-X.; Michel, C.; Schmittel, M. *Org. Lett.* **2000**, *2*, 3959-3962.
- 110) (110a) Gray, G.; Hird, M.; Lacey, D.; Toyne, K. *J. Chem. Soc., Perkin Trans. II* **1989**, 2041-2053; (110b) Bahl, A.; Grahn, W.; Stadler, S.; Feiner, F.; Bourhill, G.; Bräuchle, C.; Reisner, A. *Angew. Chem.* **1995**, *107*, 1587-1590; *Angew. Chem. Int. Ed. Engl.* **1995**, *34*, 1485-1488.
- 111) Modrakowski, C. Dissertation **2002**, <http://www.diss.fu-berlin.de/2002/38/>
- 112) Kraus, R.; Spitteller, G. *Org. Mass Spectrom.* **1989**, *24*, 861-865.
- 113) For a short overview over recent trends in hydro-de-bromination, see: Effenberger, F. *Angew. Chem.* **2002**, *114*, 1775-1776; *Angew. Chem. Int. Ed. Engl.* **2002**, *41*, 1699-1700.
- 114) Stock, L. M.; Spector, A. R. *J. Org. Chem.* **1963**, *28*, 3272-3274.
- 115) Höger, S.; Bonrad, K.; Mourran, A.; Beginn, U.; Möller, M. *J. Am. Chem. Soc.* **2001**, *123*, 5651-5659.
- 116) Boldi, A. M.; Diederich, F. *Angew. Chem.* **1994**, *106*, 482-485; *Angew. Chem. Int. Ed. Engl* **1994**, *33*, 468-471.
- 117) A polar analogue of TMS-acetylene for an easier purification of the coupling product has been described recently: Höger, S.; Bonrad, K. *J. Org. Chem.* **2000**, *65*, 2243-2245.
- 118) For a review, see: Constable, E. C. *Adv. Inorg. Chem. Radiochem.* **1986**, *30*, 69-121.

- 119) For a recent investigation into different supramolecular architectures of a simple terpyridine derivative depending on solvent/counter ions, see: Hannon, M. J.; Painting, C. L.; Plummer, E. A.; Childs, L. J.; Alcock, N. W. *Chem. Eur. J.* **2002**, *8*, 2226-2238.
- 120) Sauvage, J.-P.; Collin, J.-P.; Chambron, J.-C.; Guillerez, S.; Coudret, C.; Balzani, V.; Barigelletti, F.; DeCola, L.; Flamigni, L. *Chem. Rev.* **1994**, *94*, 993-1019.
- 121) Cargill Thompson, A. M. W. *Coord. Chem. Rev.* **1997**, *160*, 1-52, and citations therein.
- 122) Kröhnke, F. *Synthesis* **1976**, 1-24.
- 123) Yamamoto, Y.; Azuma, Y.; Mitoh, H. *Synthesis* **1986**, 564-565.
- 124) Cárdenas, D. J.; Sauvage, J.-P. *Synlett* **1996**, 916-918.
- 125) Yamamoto, Y.; Yanagi, A. *Chem. Pharm. Bull.* **1982**, *30*, 1731-1737.
- 126) For a mechanistic study, see: Wursthorn, K. R.; Kuivila, H. G.; Smith, G. F. *J. Am. Chem. Soc.* **1978**, *100*, 2779-2789.
- 127) A procedure to stannylate aromatic compounds by a  $S_{RN}1$ -reaction followed by Stille coupling has been shown recently. Additionally, the iodo/chloro selectivity of the Stille coupling has been used to couple two functionalized positions consecutively. See: Córscico, E. F.; Rossi, R. A. *J. Org. Chem.* **2002**, *67*, 3311-3316.
- 128) In analogy to: Baker, W.; Curtis, R. F.; Edwards, M. G. *J. Chem. Soc.* **1951**, 83-87.
- 129) Colasson, B. X.; Dietrich-Buchecker, C.; Sauvage, J.-P. *Synlett* **2002**, 271-272.
- 130) Leibner, J. E.; Jacobus, J. *J. Org. Chem.* **1979**, *44*, 449-450.
- 131) Abe, K.; Kitagawa, Y.; Ishimura, A. *J. Pharm. Soc. Jpn.* **1953**, *73*, 969.
- 132) Parham, W. E.; Piccirilli, R. M. *J. Org. Chem.* **1977**, *42*, 257-260.
- 133) Bolm, C.; Ewald, M.; Felder, M.; Schlingloff, G. *Chem. Ber.* **1992**, *125*, 1169-1190.
- 134) For a recent report of selective lithiation of 2,5-dibromo pyridine in 2-position, see: Wang, X.; Rabbat, P.; O'Shea, P.; Tillyer, R.; Grabowski, E. J. J.; Reider, P. J. *Tet. Lett.* **2000**, *41*, 4335-4338.
- 135) Henze, O. Diplomarbeit FU Berlin **1997**.
- 136) Kumada, M. *Pure & Appl. Chem.* **1980**, *52*, 669-679.
- 137) Rehahn, M.; Schlüter, A. D.; Feast, J. *Synthesis* **1988**, 386-388.
- 138) Rehahn, M.; Schlüter, A. D.; Wegner, G. *Makromol. Chem.* **1990**, *191*, 1991-2003.
- 139) (139a) See, for example, lit.<sup>31</sup> or: Ziener, U.; Godt, A. *J. Org. Chem.* **1997**, *62*, 6137-6143; (139b) personal information given by Dr. habil. A. Godt, Mainz.
- 140) Lytle, F. E.; Petrosky, L. M.; Carlson, L. R. *Anal. Chim. Acta* **1971**, *57*, 239



- 141) For a special macrocyclization reaction, the influence of THP side chains on the coupling efficiency was observed: Höger, S.; Bonrad, K.; Karcher, L.; Meckenstock, A.-D. *J. Org. Chem.* **2000**, *65*, 1588-1589.
- 142) Tobe, Y.; Utsumi, N.; Nagano, A.; Sonoda, M.; Naemura, K. *Tet.* **2001**, *57*, 8075-8083.
- 143) This is an enthalpic argument; entropic factors may favour the opposite direction. However, the better solubility of phenylacetylene macrocycles in aromatic solvents, and a lower tendency to aggregate, has been observed experimentally (ref. lit<sup>7,149</sup>)
- 144) For the molar solubilities one has to note that the macrocycles' molar mass is approx. 20 times larger than that of naphthalin and theobromin; the comparison of the weight solubilities therefore probably gives a more realistic picture here.
- 145) Dimroth, O.; Bamberger, C. *Lieb. Ann. Chem.* **1924**, *438*, 67-114.
- 146) Süß, P. *Fresenius Z. Anal. Chem.* **1893**, *32*, 57-63.
- 147) For recent overviews over scope and problems of MALDI-TOF in the field of synthetic oligo- and polymers, see: (147a) Räder, H. J.; Schrepp, W. *Acta Polym.* **1998**, *49*, 272-293; (147b) Nielen, M. W. F. *Mass Spectr. Rev.* **1999**, *18*, 309-344.
- 148) Höger, S.; Spickermann, J.; Morrison, D. L.; Dziezok, P.; Räder, H. J. *Macromolecules* **1997**, *30*, 3110-3111.
- 149) (149a) Zhang, J.; Moore, J. S. *J. Am. Chem. Soc.* **1992**, *114*, 9701-9702; (149b) Shetty, A. S.; Zhang, J.; Moore, J. S. *J. Am. Chem. Soc.* **1996**, *118*, 1019-1027; (149c) Tobe, Y.; Utsumi, N.; Kawabata, K.; Naemura, K. *Tet. Lett.* **1996**, *37*, 9325-9328; (149d) Tobe, Y.; Utsumi, N.; Kawabata, K.; Nagano, A.; Adachi, K.; Araki, S.; Sonoda, M.; Hirose, K.; Naemura, K. *J. Am. Chem. Soc.* **2002**, *124*, 5350-5364; (149e) Zhao, D.; Moore, J. S. *J. Org. Chem.* **2002**, *67* 3548-3554.
- 150) The X-ray analyses were done by Dr. D. Lentz in the Inorganic Chemistry Section of this Institute.
- 151) ORTEP3 for Windows –Ferrugia, L. J., *J. Appl. Crystallogr.* **1997**, *30*, 565.
- 152) (152a) Bessel, C. A.; See, R. F.; Jameson, D. L.; Churchill, M. R.; Takeuchi, K. J. *J. Chem. Soc. Dalton Trans.* **1992**, 3223-3228; (152b) Constable, E. C.; Khan, F. K.; Marquez, V. E.; Raithby, P. R. *Acta Cryst.* **1992**, *C48*, 932-934.
- 153) SCHAKAL: E. Keller, *J. Appl. Crystallogr.* **1989**, *22*, 12-22.
- 154) The influence of different solvents on the conformation of a phenylacetylene macrocycle in the single-crystal has been recently described: Höger, S.; Morrison, D. L.; Enkelmann, V. *J. Am. Chem. Soc.* **2002**, *124*, 6734-6736.

- 155) The measurements were done by Dr. P. Samorí in the group of Prof. Dr. J.-P. Rabe, HU Berlin.
- 156) For an introduction into STM in Organic Chemistry, see: Frommer, J. *Angew. Chem.* **1992**, *104*, 1325-1357; *Angew. Chem. Int. Ed. Engl.* **1992**, *31*, 1298-1328.
- 157) Samorí, P.; Fechtenkötter, A.; Böhme, T.; Jäckel, F.; Müllen, K.; Rabe, J. P. *J. Am. Chem. Soc.* **2001**, *123*, 11462-11467.
- 158) Lazzaroni, R.; Calderone, A.; Brédas, J. L.; Rabe, J. P. *J. Chem. Phys.* **1997**, *107*, 99-105.
- 159) (159a) Askadskaya, L.; Boeffel, C.; Rabe, J. P. *Ber. Bunsenges. Phys. Chem.* **1993**, *97*, 517-521, (159b) Stabel, A.; Herwig, P.; Müllen, K.; Rabe, J. P. *Angew. Chem.* **1995**, *107*, 335-339; *Angew. Chem. Int. Ed. Engl.* **1995**, *34*, 303-307.
- 160) (160a) Van Nostrum, C. F.; Picken, S. J.; Schouten, A.-J.; Nolte, R. J. M. *J. Am. Chem. Soc.* **1995**, *117*, 9957-9965; (160b) Kimura, M.; Wada, K.; Ohta, K.; Hanabusa, K.; Shirai, H.; Kobayashi, N. *J. Am. Chem. Soc.* **2001**, *123*, 2438-2439.
- 161) (161a) Zhang, J.; Moore, J. S. *J. Am. Chem. Soc.* **1994**, *116*, 2655-2656; (161b) Moore, J. S.; Zhang, J.; Wu, Z.; Venkataraman, D.; Lee, S. *Macromol. Symp.* **1994**, *77* (International Symposium on New Macromolecular Architectures and Supramolecular Polymers, **1993**), 295-301.
- 162) Höger, S.; Enkelmann, V.; Bonrad, K.; Tschierske, C. *Angew. Chem.* **2000**, *112*, 2356-2358; *Angew. Chem. Int. Ed. Engl.* **2000**, *39*, 2268-2270.
- 163) The DSC measurements were done by D. Neubert, FG Hampe, BAM Berlin, on a Seiko DSC 220C.
- 164) Ünsal, Ö.; Godt, A. *Chem. Eur. J.* **1999**, *5*, 1728-1733.
- 165) Samorí, P.; Jäckel, F.; Ünsal, Ö.; Godt, A.; Rabe, J. P. *ChemPhysChem* **2001**, *2*, 461-464.
- 166) Rapenne, G.; Dietrich-Buchecker, C.O.; Sauvage, J.-P. *J. Am. Chem. Soc.* **1999**, *121*, 994-1001.
- 167) See, for example: Ashton, P. R.; Baldoni, V.; Balzani, V.; Claessens, C. G.; Credi, A.; Hoffmann, H. D. A.; Raymo, F. M.; Stoddart, J. F.; Venturi, M.; White, A. J. P.; Williams, D. *J. Eur. J. Org. Chem.* **2000**, 1121-1130.
- 168) Belfrekh, N.; Dietrich-Buchecker, C. O.; Sauvage, J.-P. *Inorg. Chem.* **2000**, *39*, 5169-5172.
- 169) See, for example: Dietrich-Buchecker, C.O.; Sauvage, J.-P. *Chem. Rev.* **1987**, *87*, 795-810.

- 170) Wu, J.; Chen, C.; Kurth, M. J.; Lebrilla, C. B. *Anal. Chem.* **1996**, *68*, 38-45.
- 171) Compare, for example, lit.<sup>19,20</sup>.
- 172) (172a) Hissler, M.; El-Ghayoury, A.; Harriman, A.; Ziessel, R. *Angew. Chem.* **1998**, *110*, 1804-1807; *Angew. Chem. Int. Ed. Engl.* **1998**, *37*, 1717-1720; (172b) Osawa, M.; Hoshino, M.; Horiuchi, S.; Wakatsuki, Y. *Organometallics* **1999**, *18*, 112-114.
- 173) (173a) Henke, W.; Kremer, S.; Reinen, D. *Inorg. Chem.* **1983**, *22*, 2858-2863; (173b) Rojo, T.; Vlasse, M.; Belhan-Porter, D. *Acta Cryst C.* **1983**, *C39*, 194-199.
- 174) In analogy to: Harris, C. M.; Lockyer, T. N. *Aust. J. Chem.* **1970**, *23*, 673-682.
- 175) Sullivan, B. P.; Calvert, J. M.; Meyer, T. J. *Inorg. Chem.* **1980**, *19*, 1404-1407.
- 176) Constable, E. C.; Cargill Thompson, A. M. W. *New. J. Chem.* **1992**, *16*, 855-867.
- 177) König, B.; Zieg, H.; Nimtz, M.; DeCola, L.; Balzani, V. *Chem.Ber./Recueil* **1997**, *130*, 529-533.
- 178) Encinas, S.; Flamigni, L.; Barigelletti, F.; Constable, E. C.; Housecroft, C. E.; Schofield, E.; Figgemeier, E.; Fenske, D.; Neuburger, M.; Vos, J. G.; Zehnder, M. *Chem. Eur. J.* **2002**, *8*, 137-150.
- 179) Braddock, J. N.; Meyer, T. S. *J. Am. Chem. Soc.* **1973**, *95*, 3158-3162.
- 180) Belser, P.; v.Zelewsky, A.; Frank, M.; Seel, C.; Vögtle, F.; DeCola, L.; Barigelletti, F.; Balzani, V. *J. Am. Chem. Soc.* **1993**, *115*, 4076-4086.
- 181) Yi, C. S.; Liu, N. *J. Synlett* **1999**, 281-287.
- 182) Constable, E. C.; Lewis, J.; Liptrot, M. C.; Raithby, P. R. *Inorg. Chim. Acta* **1990**, *178*, 47-54.
- 183) (183a) Tietze, L. F.; Eicher, T. *Reaktionen und Synthesen im organisch-chemischen Praktikum und Forschungslaboratorium*, Thieme-Verlag, Stuttgart, **1991**; (183b) *Organikum, Organisch-chemisches Grundpraktikum* **1996**, 20. Auflage, Johann Ambrosius Barth Verlag, Heidelberg
- 184) Coulson, D. R. *Inorg. Synth.* **1972**, *13*, 121-124.
- 185) This is described in: Beinhoff, M. Dissertation **2002**, FU Berlin, <http://www.diss.fu-berlin.de/2002/13/>
- 186) The occurrence of complexes with mixed PF<sub>6</sub><sup>-</sup>/NO<sub>3</sub><sup>-</sup> counterions after chromatography with nitrate containing eluent has been described; ref. lit.<sup>178</sup>
- 187) The solid state NMR was measured by T. Emmler, research group of Dr. G. Bunkowsky, in the Physical Chemistry Section of this Institute.